

INSTITUTION NOTES

August 1941

Institution Luncheon, 26th September.

The Chairman of the Production Executive of the Cabinet, the Right Hon. Ernest Bevin, P.C., M.P., Minister of Labour and National Service, and Commander Sir Charles Craven, O.B.E., R.N., Controller General, Ministry of Aircraft Production, will be the chief speakers at the Annual Luncheon of the Institution to be held at Grosvenor House, Park Lane, London, on Friday, 26th September.

Members intending to be present are kindly requested to make early application for tickets. Forms for that purpose are being circulated with this issue of *The Journal*.

Production Engineering Courses at Technical Colleges.

As the outcome of requests for Higher National Certificate Courses in Production Engineering put forward on behalf of the North Eastern Section of the Institution, an important conference, convened by authorities of the Board of Education, was held in Newcastle-on-Tyne on 12th August. Representatives of several Technical Colleges in the North Eastern area, and of many interested firms, were present. The attendance numbered close on 50. An influential Committee was appointed to further the scheme.

Mr. W. A. Harriman, M.B.E., President of the North Eastern Section, headed the representation present from the Institution, which included the General Secretary, Mr. R. Hazleton, and Mr. J. Nicod, Hon. Secretary, North-Eastern Section.

Courses for the Ordinary National Certificate in Mechanical Engineering with sufficient Production Engineering content to counter-signature by our President on behalf of the Institution have been approved at Birmingham Central Technical College and Northampton Polytechnic Institute.

North Eastern Section.

The new North Eastern Section is to hold its first Annual Dinner on 29th August, at the County Hotel, Newcastle-on-Tyne, at 7 p.m.

Portrait of the late Lord Austin.

The latest addition to the list of Institution oil paintings of Past-Presidents is a portrait of the late Lord Austin. It has been presented to the Institution by the Trustees of Lord Austin's estate and has been painted by Mr. Philip Naviasky, the Leeds artist.

Death of Mr. H. B. Pratt.

We deeply regret to announce the death of Mr. H. B. Pratt, late President of the Southern Section.

Subscriptions for Research Department.

Subscriptions towards the work of the Institution's Research Department have been received since those announced last month, as follows :—

	£	s.	d.
Hoover, Ltd.	250	0	0
Standard Telephones and Cables Ltd.	100	0	0
Climax Rock Drilling and Engineering Works, Ltd.	100	0	0
Parnall Aircraft, Ltd.	100	0	0
G. Beaton & Sons Ltd.	26	5	0
George Kent Ltd.	25	0	0
W. P. Butterfield, Ltd.	10	0	0
L. Archer (Student)	10	0	0

Personal.

Mr. J. D. Scaife, Past-President, Chairman of the Executive Committee of the Research Department, has been appointed Director of Ball Bearing Supplies, Ministry of Supply.

Mr. H. W. Hobbs (Member) has recently been added to the Technical and Publications Committee of the Institution.

Coventry Section President.

This is now Mr. H. D. S. Burgess, Mr. J. A. Boyes (retiring Section President) having become the Section Vice-President.

THE UTILISATION AND TRAINING OF LABOUR UNDER WAR CONDITIONS

*Paper presented to the Institution by B. C. Jenkins,
(Member), Chief Inspector, Munitions Labour Supply,
Ministry of Labour and National Service.*

AS many of those present are aware that the author is temporarily attached to the Ministry of Labour, it is his duty to point out that this paper is written and read by him in his private capacity as a member of this Institution. The paper has been prepared and is being read with the sanction of the Ministry and to that extent can be taken as being of a semi-official character, whilst the views expressed must of necessity be coloured to some extent by the intimate contact of the author with the problems facing the Ministry from day to day. It does, however, express his personal views, as a production engineer, of the part which industry in general and the production engineer in particular must play in assisting the production effort of the country.

The refutation of the argument that the democratic system of Government is obsolete and inferior to that of the totalitarian states, and that the people of this country have become a decadent race is dependent upon the complete and whole-hearted co-operation of all members of the community in the fight against the common enemy.

If we are to repel successfully and defeat this enemy who has attacked our towns and cities ruthlessly killing and maiming our womenfolk and our children, whose system threatens the lives and liberty of every man, woman, and child, then we must be prepared to sink our individual inclinations and preferences and to devote our every effort to the needs of the State in this time of trial and difficulty. Our greatest danger is that attitude of complacency which leads us to hope that things will come right in due course, to leave initiative to the other fellow and to expect and to wait for leadership from someone else instead of exploiting to the full the power of leadership and organisation within ourselves. We have every right to be proud of the fact that "We can take it" but only if we make the mental reservation that we can also return, with compound interest, what we are forced by circumstances to endure.

We, as engineers, cannot administer the dose, but in this war, more so than in any war of the past, we have the duty and privilege of supplying the means by which the Forces can hand out more than the enemy is capable of taking.

Skilled Labour Position Prior to Outbreak of War.

It is unnecessary to stress to an audience of engineers the vital importance of labour to the production effort of the country, or to enlarge upon the shortage of skilled labour.

It is, however, worth while examining the position of skilled labour supply in this country prior to the outbreak of war. During the period from 1918 up to the outbreak of war in 1939, we find a gradual but consistently progressive decay of the old system of trade apprenticeship which had for many years given this country a lead over its competitors in the manufacture of high grade engineering products. The result was that prior to the outbreak of war the engineering industry was experiencing the greatest difficulty in obtaining skilled labour to meet its requirements.

The rapid advance, during the same period, in the utilisation of semi-skilled and unskilled labour by the introduction and use of special machinery, jigs, tools, and equipment, counterbalanced to a large extent the wastage, by retirement or death, of the skilled mechanic, and lulled industry into a sense of security and gave rise to the idea that the day of the skilled mechanic was over. The high rates of pay earned by people of limited skill, often higher than those paid to the high grade skilled mechanic made entry to the skilled field unattractive to all save those few men whose pride of craftsmanship in carrying out a job of work was sufficient recompense for acceptance of a lower standard of living.

We, as production engineers, must to a very great extent shoulder the blame for our lack of foresight in not realising what was taking place and taking steps to prevent it.

Effect of War Conditions on Skilled Labour Position.

The outbreak of war emphasised in no uncertain manner this dearth of skilled labour; the demand for machinery, tools, gauges, and equipment in volumes entirely out of proportion to the normal has alone set us a problem which has not yet been satisfactorily solved. This, however, is only one part of a much larger problem.

The nature of the products we are called upon to manufacture such as aero engines, tanks, guns, etc., calls for a degree of precision in manufacture higher than anything we had in 1914-18 and, in many cases, in much larger volume. The highly mechanised Forces must have their quota of skilled men for maintenance and repair of their mechanical equipment, and the demand must increase as the supply of equipment increases.

Each of the above items affects the skilled labour position, but the main factor is the necessity to increase vastly the output of engineering products of munitions nature.

This involves the introduction to, and absorption by, the engineering industry of huge numbers of both men and women who,

in the main, have had no experience of engineering practice.

It has been calculated on the basis of the best information of the future production programmes that the present forces of the industry must, during the next eight months, be diluted to the extent of approximately 750,000 people. A large proportion of these must inevitably be women and the remainder men over military age and, therefore, not having the flexibility of the younger generation.

It is obvious that these people cannot be absorbed and become productive units except by utilising to the full such skilled labour as may be available.

Statement of Labour Supply Problem.

From what has been stated in the foregoing paragraphs the problem facing industry is that to meet the Government production programmes, approximately 750,000 people unskilled in engineering practice have to be absorbed, trained, and turned into efficient production units, in the next eight months, and that this must be carried into effect without any addition to the existing skilled labour force. Analysis of the returns made by industry to the Ministry of Labour of the grades of labour at present engaged within the industry, in the light of the increased production programmes, show that skilled labour must on the average be reduced from 40 to 30% of the total labour force engaged, an overall reduction of 25% in the individual factory. Also that female labour must be increased to 30% of the total labour force.

It should be noted that these figures are averages for the country and do not strictly apply to any particular section of industry, or any particular firm, within a given section. It is obvious that for certain classes of manufacture a higher percentage than 30% skilled labour will be required and that the amount of skilled labour available for other firms will be below 30%.

The same remarks apply to the use of female labour, as many industries are unsuitable for the employment of such labour so that other firms must employ a much higher percentage than the average of 30% mentioned.

Some firms may feel perfectly complacent about the labour position, as, so far as they can see, they already have their quota of labour both skilled and semi-skilled, and are not likely to be putting in demands of a serious nature for increases in their labour force.

It should be noted that new factories are already in existence with machinery, tooling, and equipment ready to produce vital munitions requirements, and lacking the nucleus of skilled labour which will enable them to start production and to train the unskilled labour which must be absorbed to bring their output up to the required standard. Others are approaching completion and will then be in the same position.

Necessity for Planned Utilisation of Labour.

The whole problem of labour supply must be dealt with on one common planned basis; the utilisation and distribution of skilled and semi-skilled labour and the introduction and training of unskilled labour both male and female are interdependent.

The degree of success obtained will largely depend upon operational planning based on the use of female labour wherever possible, on a maximum use of semi-skilled labour, and the confinement of the use of skilled labour to work which cannot be performed by people with a lower degree of skill.

Many of my listeners will have already received and read the memorandum issued by the Institution of Production Engineers entitled "The efficient utilisation of labour under war conditions" but, for the benefit of those who have not, the following quotations are made.

A process of analysis in detail form must be applied to the tasks which skilled operators are called upon to perform, and must be carried out to an extent which would not be considered economic or desirable if ample supplies of skilled labour were available.

The objective should be to make the task fit the type of labour available rather than wait until labour is trained to a standard suitable to handle the ordinarily accepted layout of operations.

It is agreed that, according to the normal standards of industrial requirement, labour is graded to deal with the allotted tasks in a most efficient manner, and it therefore follows that without further drastic analysis and breakdown of operations with a view to simplification of tasks, the distribution of existing skilled labour forces cannot be materially improved.

An important contribution to the problem of redistribution can, of course, be made by promoting or upgrading of labour to perform tasks of a higher grade after a shorter period of experience than would normally be considered necessary.

This method does not, however, ensure the full and efficient utilisation of the acquired skill of operators, neither does it assist directly in the absorption of the available mass of untrained labour which must be regarded as the raw material of the labour supply phase of industry. Nevertheless, such promotion and upgrading should be carried out to the fullest possible extent and can be regarded as a forcing ground for the production of labour capable of handling the higher grade skilled operations.

The grade of labour allocated to any particular operation in the engineering industry is determined by the degree of skill necessary to the performance of some particular portion of that operation. Keen analysis of such operations will more often than not reveal possibilities of segregating those portions requiring a high degree of skill in performance, the remaining portion being such as can be

carried out by operators of a lower degree of skill. This applies to practically all operations in the manufacture of engineering products but applies with particular emphasis to machining operations. Since the shortage of skilled labour is particularly acute in that field it is vitally necessary to ensure, so far as is practicable, that operations are split in such a way that the tasks assigned to the higher grades of skilled labour are appropriate to their skill and training.

It may be argued that the double or triple handling of a piece due to the splitting of operations means an increase in the number of men hours taken to handle a given amount of product. In some cases this may be true, but it must be regarded as practicable to do so if a larger over-all output can be achieved owing to the absorption of additional labour of a lower degree of training and experience.

Experience has, however, proved that in many cases sub-division of operations has actually increased output from a given amount of plant and has also enabled lower grade machinery to be used with maximum efficiency.

Machinery of a low grade type unsuitable for finishing operations can be used for roughing and semi-finishing operations using much heavier feeds than would be practicable on machines which must be maintained in a suitable condition for carrying out precision finishing operations.

The sub-division of operations cannot be carried out successfully by haphazard methods, but must be subject to carefully planned analysis with a view to setting out the processes in a manner calculated to produce a series of graded tasks.

Efficient planning along these lines should produce task-grading of the flow type by means of which it should be possible to absorb inexperienced labour for the simpler tasks and by easy stages of progression to bring it along through the semi-skilled range until it is capable of carrying out the lower grade skilled tasks. This method of operation planning simplifies the problem of tuition of trainee labour and the provision of instructors for the purpose of giving such training, as existing labour with the assistance of toolsetters, chargehands, and foremen will be found capable of coaching labour through the simple stages of progression.

The question of the provision of such aids to production simplification as special jigs, fixtures, tools, and gauges need not be stressed but, even in this connection the carefully planned sub-division of operations can be of assistance. A jig or fixture for complicated operation may be of a costly nature both in money and in men hours taken in its manufacture, but sub-division of the operation and the provision of simple jigs or fixtures to handle a section of the operation will, in the case of existing jigs, enable increased output to be obtained at a lower tool cost. In the case of new work it should simplify design and cheapen the manufacture of jigs and fixtures,

and at the same time enable labour of a lower grade to be used for the less important sections of the operation. It is, however, vital that due consideration be given to the provision of proper location and datum points when designing such a sequence of jigs, otherwise the desired final accuracy of the product may be affected and the principle of simplification unjustifiably blamed for the error.

The problem of production executives in applying the process of simplification of manufacture are infinitely variable, depending upon the type of product and the volume in which it is to be produced. It would therefore serve no useful purpose to give details of particular applications in any field of engineering production technique. It can, however, be stated that the same fundamental principles apply, whatever the product and whatever the volume of product may be.

Planned and co-ordinated action with a view to simplification of complex operations must inevitably simplify the problem of utilisation and training of the abundant supply of untrained labour for the lower grade tasks. It should also enable the existing skilled labour to be redistributed to handle a largely increased volume of production as such labour would only be used to carry out tasks to which such skill is essential.

The production principles enunciated are in everyday use in all engineering works to a greater or lesser degree, and the only divergence from existing practice now suggested is that operation simplification shall be carried out to a degree far in excess of what is necessary under ordinary industrial conditions, and that the absorption and training of unskilled labour shall be accelerated.

These paragraphs give some indication of the line of thought and action which must be taken if the objective is to be attained.

The Introduction and Training of Unskilled Labour.

One can hardly envisage any class of munitions manufacture in which it would be impossible to utilise the services of unskilled labour to carry out many of the lower skilled tasks, and in doing so every effort should be made to utilise female labour.

Generally speaking any work for which unskilled male labour can be trained is also suitable for female labour except in those jobs for which women are physically unsuited.

It is suggested that for those jobs of a simple routine repetitive nature for which operatives can be trained in a few weeks, the training should be carried out in the production plant utilising the services of existing operators, tool setters, and charge hands to train such operatives.

Whilst for other jobs of a more complicated nature requiring a longer and more comprehensive training it is now possible for any employer of labour to arrange, through the local Employment Ex-

change of the Ministry of Labour, for training to be given either in a Government training centre or a technical institution.

The type of training to be given is flexible and can be modified or changed to suit employer requirements, and the training centres will be pleased, if the employer so desires, to give the training on the employers' own materials provided suitable equipment is available.

Training allowances in such cases will be paid by the Ministry of Labour during the training period, so that no charge is involved until the trainee enters the firm's employment.

You are all aware that trained female labour has been largely used for many years on various types of product, but may be doubtful as to the extent to which it is economically possible to introduce such labour without any past engineering experience, and for this reason I am quoting the following instances of the introduction of untrained female labour, each instance referring to one firm only.

Manufacture of	airframes	1,622
"	"	Aero engines	...	880
"	"	Aero engines	...	1,715
"	"	Guns, tanks, and torpedoes	...	250

These women are engaged on work of the following categories :

Capstan operators.	Fitting.
Milling machines.	Assembling.
Grinding machines.	Inspection.
Gear cutting machines.	

Many similar cases could be quoted from other production shops whilst in other cases women and unskilled male labour has been introduced successfully into sub-tool rooms.

Upgrading of Semi-skilled Labour.

The introduction of any appreciable volume of unskilled labour cannot be put into effect successfully without an extension of the ranks of toolsetters. The demand for toolsetters is greater than the supply at the present time, and the absorption of a volume of unskilled labour must increase the disparity between supply and demand. This gives the opportunity to utilise more efficiently the services of setter operators by allocating them to setting activities entirely, and also to take some of the better class operators and train them as toolsetters.

In the early stages men so upgraded, even after training has been given, will require assistance, and it is suggested that a high grade setter be allocated as a chargehand setter, whose sole duty is to supervise the work of the upgraded men, giving assistance and advice as necessary.

The training of men to be upgraded to the toolsetter class can be handled in one of two ways, either by the firm by whom they are employed setting up their own training scheme, or alternatively, by

instruction under a scheme set up by the Ministry of Labour.

If the latter alternative is adopted, the employer will be called upon to pay the wages of the man and any expenses which may be entailed whilst the employee is being trained. The Ministry of Labour will cover the cost of the actual training whether it be in a Government training centre, technical institution, or in an industrial establishment operating a training scheme set up under the auspices of the Ministry. Obviously, where it is possible for the training to be carried out in the employers' own organisation, that method is to be preferred as the man will be trained on the machinery and materials he is to handle after completion of his training.

The Ministry of Labour are also prepared to train other production operatives that firms may decide to upgrade on the same terms as those applicable to toolsetters and are prepared to adopt a curriculum laid down specifically to meet employer requirements.

The success of upgrading courses undertaken by the Ministry will depend upon the degree to which employers of labour are prepared to co-operate with the training section of the Ministry of Labour.

Employer requirements, even in the same field of application, are likely to be of a widely divergent nature, and results will be disappointing unless care is taken to assist and advise those responsible for the inception and carrying out of such training.

The job should be regarded as a joint responsibility of employer and Ministry, the employer through his representative agreeing with the Ministry's training section a course best calculated to meet his particular requirements. On completion of the training course the trainee should receive sympathetic assistance which will enable the training given to be fully capitalised, and in effect his employment should consist of a continuation of the training process.

No matter how competent the instructor may be and how intensive the course of training given it is impossible to teach all those little tricks which can only be found out by years of practical application in the workshop, but if the training course is right, the knowledge of fundamental factors will enable the average intelligent operator to pick up further knowledge in a rapid manner.

Machine toolsetting is a good illustration of this point of view. It is a comparatively simple matter to teach a man to set up a machine to carry out a given operation, using tools and equipment which, theoretically, should produce satisfactory work, but the toolsetter must not only be capable of setting up a machine correctly but must be able to diagnose rapidly troubles which arise and find a quick and certain cure so that the machines under his control will consistently produce parts to the standard of accuracy and finish required. This knowledge can only be acquired by practice under actual workshop conditions.

Upgrading to Meet Tool Room Requirements.

The provision of additional tool room labour is probably the most difficult problem of labour supply and, at the same time, is one of vital urgency as the supply of jigs, tools, and equipment is essential to the extended employment of semi-skilled and unskilled operatives.

The problem is complicated by the fact that it has always been the accepted custom to train tool room operatives in the tool room and on tool work. This was probably necessary when a tool maker was skilled in all phases of tool manufacture and was capable of taking the raw material through all its stages to the finished product.

The modern tool room is planned on different lines, slowly but inexorably the methods of operation have been revolutionised, so that to-day the average tool room is laid out on a semi-production basis. The all-round tool maker has been replaced by men who specialise in one or more branches of tool room practice, and can be classified under such headings as tool turner, tool room miller, tool room grinder, tool room boring machine operator, tool fitter, gauge maker, etc. Most of these men have been trained in tool rooms, and one must agree that granted the necessary time, it is the best method of developing tool room operatives. On the other hand, we must recognise that, generally speaking, present day tool room operators have been trained as specialists, and apply their specialised knowledge in a limited field.

The tool room operator, like those trained on production, passes through various stages of progression, and is given tasks selected according to the stage he has reached. The introduction to tool rooms, under present conditions of urgency, of production operators who have been trained in a similar field of application should not present much difficulty provided due care is exercised in the selection of the tasks they be given to perform.

The sub-division of operations in the manner outlined in earlier paragraphs of this paper will enable men of suitable production experience to be readily absorbed and will also provide a graded series of steps of progression to bring the production operator along until he is capable of doing work of the highest grade. The Ministry of Labour is prepared to provide upgrading courses for tool room labour under the same conditions as those outlined under upgrading of semi-skilled labour.

Planned Progression of Labour.

The programme outlined in the foregoing paragraphs may sound somewhat formidable to the harassed executive, but a little calm consideration will show that it consists of carrying out in a planned sequence and in an intensive manner what industry has always carried out in a more or less perfunctory way. Analysed, it

means planning the job to facilitate the steady progression of labour from grade to grade, mapping out the steps of progression through which labour of a given type is to be promoted, seeing that each move calls for the use of a little more skill on the part of the operative promoted. This will entail a keen observance and judgment of the characteristics of individual employees with a view to utilising to the full the natural ability of every one.

Obviously, all employees will not be suitable for upgrading beyond the simple operative tasks, whilst others will not be capable of going beyond a given stage. The executive, be he chargehand, foreman, superintendent, or a higher executive, who takes the trouble to study his labour with a view to making full use of the potential ability lying latent in the labour force under his control is going to find the process most interesting and educative.

The process of training and upgrading should not cease at operative labour, but should be continuous throughout the whole range from operative labour to the higher executive positions.

Let every employee, male or female, know that each and every one has possibilities of continuous promotion provided they have the ability and interest to take advantage of the opportunities as they arise, and that only as a last resort will people be brought from outside to take the higher grade jobs. Promotion must be accompanied by suitable increases in wage rates or salary payment; if increased responsibility is not backed up by financial benefit, promotion soon becomes "sour grapes." In making promotions, care should be taken to see that the person so promoted is given the opportunity of learning the rudiments of the job he is to take on, and is given every assistance possible before being left to carry the full load.

This process of steady and consistent promotion within the plant is calculated to produce a spirit of harmony and satisfaction which should result in the building of a team of contented workpeople having a keen interest in the welfare of the organisation within which they are employed.

It is impossible to overstress the need for a carefully planned campaign of training and upgrading, and consideration should be given to the advisability of allocating a suitable executive of high rank to lay down a plan and policy for the whole factory, not merely for the purpose of the present emergency, but as a permanent feature of good organisation. It is obvious that by careful planning, the training and upgrading will be carried out along logical lines of progression, and that the labour force will be of a more flexible character and contain far less of the weak links than would be the case in the more loosely knit organisations.

Conditions Affecting Utilisation of Labour.

The press has, in the past few weeks, prominently featured the efforts the Minister of Labour and National Service has made, and is continuing to make, for the welfare of labour both within and without the factory. Some people may regard such innovations as being unnecessary, and fail to realise that the productive effort of the country can benefit by such means.

Heavy labour turnover means a definite production loss, and anything which can be done to minimise this is not philanthropy or coddling, but is a contribution to the war effort and is a businesslike procedure. The difference between the firm with a heavy labour turnover and one in which labour stays put, is not always, as people imagine, one of the size of the pay packet. Investigation often proves that the reason given for leaving appears to be of a trifling character and does not make sense, but careful analysis of a number of cases will show that it is the host of little things which go to make the difference between the comfortable and the uncomfortable shop that is the true cause of high labour turnover. Heating, lighting, ventilation, canteen accommodation, quality of food available, facilities for washing, storage and change of clothing, are items within the control of managements.

The question of transport to and from the factory is of far greater importance than is generally realised, and although this is beyond the control of factory managements, every effort should be made to improve such facilities. It may be possible to make local agreements with neighbouring factories for the staggering of starting and finishing times which will enable transport to carry full loads in both directions. In the larger factories it may be possible to do this by different departments starting and leaving at staggered hours, the same applying to meal breaks. Treatment of labour within the factory should be considerate and calculated to ease the strain under which all classes are now operating. Deliberate searching for the minor breakage of factory rules and those small delinquencies which we are all aware occur in every factory should be avoided. It is not suggested that discipline should be allowed to break down, but that those controlling labour should endeavour to obtain results rather by the creation of a spirit of comradeship and co-operation.

Where this is successfully achieved a happy, contented, and efficient labour force is the result.

An organised method by which employees can ventilate any grievances either real or imaginary should be part of the set up of any industrial organisation, particularly so in times like the present when subversive elements take advantage of the small troubles to create an explosive atmosphere which can quickly lead to trouble of a major character.

Grievances are like sore spots, if attended to and properly treated in the early stages they can usually be cured by simple measures, but if ignored or driven underground they continue to fester and spread until the whole body becomes infected.

All these things have a bearing on the efficiency of labour and should be attended to as a matter of plain commonsense business.

Generally speaking, consideration for employees begets consideration for employers and, even though this is not always the case, the principle is not affected.

Labour Supply Organisation—Ministry of Labour.

This paper would be incomplete without reference being made to the Labour Supply Organisation set up by the Ministry of Labour consisting of Labour Supply Committees and Labour Supply Inspectors operating under the direction of the Divisional Controller for each area.

The main function of this organisation is the economic and efficient distribution and utilisation of existing labour forces, and I wish to take this opportunity of asking for your sincere co-operation with the members of this organisation in the difficult task they are called upon to perform.

I fully appreciate the difficulty of regarding the visits of a labour supply inspector in a friendly spirit when you possibly know that his objective is the withdrawal and transfer of a portion of your skilled labour force which you find so difficult to replace, also your impatience when he cannot provide you with the skilled men you so urgently require.

The men calling upon you may not have the complete knowledge of your particular phase of industry which you yourselves possess, but remember, they have many organisations of widely varying character to visit in the course of their duties, and it would be a practical impossibility to find men having complete knowledge of all the various types of manufacturing organisations which comprise the munitions industry.

However important your firm may be, or the work upon which it may be engaged, it is only one pebble of the beach which goes to make up the industry.

The labour supply organisation has the difficult task of spreading an admittedly inadequate supply of skilled labour over the whole of the industry as equitably as possible.

The organisation, in fact the whole organisation of the Ministry of Labour, has been set up in the interest of the State; like all others it is by no means infallible, and asks for and will appreciate the complete co-operation of industry in solving the urgent problems with which it is called upon to deal.

The magnitude of the task will be realised if we take into con-

sideration that the enemy has control over approximately 250 million people, all of whom he is prepared to exploit ruthlessly to produce the means to defeat this old country of ours.

The Ministry will do everything within its power to assist industry in meeting the labour requirements of the production programmes, but the final solution must lie in the hands of the people controlling the industries of the country.

The part played by the engineering industry in this war is every bit as important as that of the fighting Forces, and failure to do everything which lies in its power to utilise to the full the productive effort of every unit of labour available is equivalent to desertion in the face of the enemy.

Conclusion.

In conclusion, I ask that every one of my listeners to-day shall act as a propagandist of the gospel of efficient utilisation of labour : that he shall drive home the urgent need for accurate planning with a view to conservation of skilled labour to everyone concerned from operative labour up to the managing director. Sell the necessity for dilution to the utmost degree to operators, setters, tool room operators, chargehands, and foremen.

It is the problem not of one individual, one Minister, or the Government, but one which concerns all men and women in the country who value the welfare and life of those near and dear to them.

Discussion

London Section

MR. W. C. PUCKEY : Before saying anything about the paper, I should like, as a member of this Institution and of its War Emergency Committee, to pay tribute to Mr. Jenkins for the courage and initiative, skill and energy he has shown in bringing this matter forward. It is very rare in these days to find people who are willing to devote the time, energy and ability which Mr. Jenkins has given to presenting a paper of this kind, and I know that on your behalf I can pay him a very warm tribute for raising this very important matter.

I am not delivering a sermon, but it is the custom of clergymen who do so to have a text, and for my very few remarks I also should like to have a text. It is "The Lord helps those who help themselves," and I might add a rider to that by saying "And the Lord help those who can't !"

Production engineers have many problems to face, and many of those problems are directly or indirectly connected with labour ; but we must narrow this discussion down to the specific job of the production engineer. I feel that so far as the production engineer is concerned, to a very large extent the problem will be solved if he does nothing more than take full advantage of all the "meat" which has been made available by the War Emergency Committee of the Institution in the booklet to which Mr. Jenkins referred, "The Efficient Utilisation of Labour in War Conditions." I hope that if any of you have not had copies you will take steps to obtain them and spread them among your friends,

A good deal of the "meat" is concerned with the question of the subdivision of operations, which is productive of good results, not only in the shop down to the lowest operation on the machine or fitting bench, but also in the toolroom and among the supervisors, foremen and managers. I suggest that you subdivide your operations as far as possible right up to the top, including the board of directors. That is outside our scope at the moment, but subdivision can be applied throughout the whole labour situation, and, if the gospel of efficient utilisation as contained in this booklet is passed on, a great number of our problems will be solved.

I do not think that there is a shortage of skilled labour ; at the present time I feel certain that there is a large amount of skilled labour which is still not being used to the fullest possible extent. I do not get about the country to-day as much as I did in peace-

time, but I have been about enough to make certain that in many non-essential industries, for example, and in others, skilled labour is being used on jobs where it should not be employed. That is a challenge to us. We are production engineers directly concerned with utilising the skill of these people, and, if we do not do it ourselves and see that it is done, we cannot blame the Ministry for not supplying this type of labour to us. In my own factory there are plenty of cases. We are trying to deal with the position, but we should all search our own souls and our own departments more than we have done so far before we cry out, as some of us have.

Mr. Jenkins referred briefly to the question of supervisory and managerial labour. He mentioned the "harrassed executive." I do not see many harassed-looking people here, although there are many executives present; but a great many of us work much longer hours and many of us work under much greater strain than we should; and, whatever may apply to the labour in the shop, whatever may be the problem of the machine or the fitting bench, the problem of the people who can control something and get something done by planning and thinking ahead is still the most important problem of all. I should like Mr. Jenkins to consider this matter more fully than he has done in his paper. I suggest that this matter of up-grading and of utilisation by subdivision of operation on the part of executives, those in managerial and supervisory positions is probably of greater importance than the question of the people lower down the scale.

This matter depends very much on individual firms. There is a tendency in these days to blame the Ministry of Labour for this, that and the other, to say that they have a lousy lot of inspectors going round, and so on. The problem, however, is still very much one for the individual firm to tackle, and it all depends on your getting down to your own particular factory and your own particular job.

I would remind you that the new Schedule of Reserved Occupations is coming out soon, and the sooner it is out the sooner will numbers of firms know what additional readjustments they have to make. I mention it, however, because the fact that the new schedule is known to be in the offing must have a very disturbing effect, if the full implications are not known to industry as quickly as possible. But it does depend on us as individual executives, and in no circumstances should we attempt to blame the Ministry of Labour before we have read all the available documents which deal with the matter and considered our own departmental and factory problems to a much greater extent than is the case in many instances at the present moment.

How can we help each other? I feel sure that many of us have bright ideas which are applied in our own factories, but we do

not necessarily pass them on as readily as we should to other people. This Institution is a definite means of spreading that information, and if any of you tried any good ideas concerning this question of the utilisation of labour, I suggest that you should pass them on as much as you can. Pass them on to the Institution. The War Emergency Committee will shortly appeal to the general body of members for additional help. Here is a way in which the Institution can not only take a leading part—which we already have done; I feel we have played a much more leading part than any other Institution in this sort of way—but we can go a stage further if you will pass on your bright ideas and see that they are made known to a greater public among those concerned with production.

Do encourage your own people to go out and see what is going on outside, and encourage others to come and see what you are doing. Years ago a number of the more progressive firms used to adopt that as a regular procedure, but since the war began, through a desire for secrecy, inability to find the time, or some other reason, it has dried up very remarkably. I suggest that it has dried up too far. If you send some of your executives and men in supervisory positions to other firms, and encourage others to come to see you, within the limits of the requirements of secrecy, where they really exist, I feel sure that spreading of information, that incentive to discover things which may be of use in your own factory, will be of tremendous assistance to you in dealing with this problem.

MR. B. C. JENKINS: I should like to thank Mr. Puckey for his attempted defence of the Ministry of Labour. Although I am a member of the staff of that Ministry, I make criticisms of it and do not want particularly to uphold it; but I feel that there is much in what Mr. Puckey has said in regard to the way in which industry blames the Ministry of Labour, and for that reason I have pointed out, at the end of my paper, that this problem is essentially one for industry. If we were working on ordinary commercial jobs, and there was no war, we should not dare to say that we could not get our products out because of lack of labour; we should find the labour somewhere and use it, and that is what we have to do now.

I agree with that was said about planning, and I feel that that is something for which the Ministry of Labour cannot be blamed; they do not control that so readily as they do the operative labour, and it is something which cannot be developed in five minutes. I would hesitate very much to suggest to anyone the right type of labour to use. If I were to make a suggestion at all, it would probably be contrary to what others would suggest, because the first man that I should try to push up would be one from the shop. Planning is not something of a theoretical nature; my view is

and always has been that it should be 90 per cent practical and 10 per cent theoretical.

Mr. Puckey referred to the criticisms of the inspectors. I have had a great deal to do with these inspectors. I do not say that they are all good or all bad, but to my knowledge they are carrying out a most difficult job in a most efficient manner. At some places they meet with reasonable treatment, but their work is not made easier by the reception which they get elsewhere. The fact that, as I have pointed out in the paper, they do not know your problems in precisely the same detailed way in which you know them tends to make people short with them; if you feel that an inspector does not understand your problem, then tactfully put your problem to him, try to give him an idea of what your difficulties are, and so you will make his job easier and help to educate him, and the Minister of Labour will be grateful.

This paper was not intended in any way to replace the original memorandum issued by the Institution; it was merely intended to be complementary to it, and to emphasise to a very much greater extent than did that memorandum the need to utilise female labour. We are going to get into a progressively worsening position as regards available male labour, and those who do not take advantage of the possibilities of taking in female labour and training it as rapidly as possible are going to fall by the wayside; because, as the demand of the Armed Forces for man-power increases, industry is going to lose numbers of men who are at present available.

MR. B. H. DYSON: After reading the host of articles which have been published recently on the necessity of training labour, I cannot help feeling that so many talking moles have thrown up so many heaps that we cannot see the training ground for mountains! In fact, as Mr. Jenkins has said, it seems that to-day we are in the main suffering for our sins of yesterday in the matter of neglecting training. It is, however, very encouraging to see Mr. Jenkins in his present important position, for we all realise that his past activities ensure the correct background.

I myself fully realise the necessity for training, and I have done a small amount of work in preparing some of the initial ground; but it must be emphasised that the first thing we have to do is to know what we want to train. For instance, we have not the time nor the desire to train new labour to be electrical engineers, but we have got to train a quantity of labour to make commutators, to wind armatures and to build generators. This distilling, therefore, seems the angle from which to tackle the problem, and in doing this we find that the essential feature is to ensure that all those who are engaged on the important job of training, whether they be instructors, foremen, charge-hands or superintendents, shall teach the same principles. Nothing is more detrimental than for

the operator to be taught one set of instructions in the training period and then for him to find something different being done on the actual job. In order to overcome this, I think that we have to lay down and circulate to all concerned some standard procedure. Mr. Puckey took as his text "The Lord helps those who help themselves." Probably that is why we have called our instruction books "Help Yourself" booklets.

Next comes the question of whom we have available to train. It appears that first of all we have existing labour which can be upgraded; secondly, labour on non-essential work that can be transferred; and thirdly, labour that has not previously been engaged in industrial manufacturing. In this way, foremen have been promoted to progress and planning engineers—I am pleased to see that Mr. Jenkins agrees with that—and operators to foremen and machine setters, time study engineers to foremen or departmental chiefs, sales supervisors and district sales managers have become purchasing agents, salesmen have become A.R.P. organisers, garage managers have been engaged as stores supervisors, school teachers as training department instructors, estate agents as progress chasers and poster artists as tool draughtsmen.

The most important thing we can do is to utilise our existing labour to the fullest extent. It will often be found that 25 per cent of our existing labour is wasted, sometimes because of known and sometimes because of unrecognised inefficiency. What factory can truly say that there is no waiting time and no idle time to record? How many times do we find labour waiting for tools, waiting for set-up, waiting for material for parts or waiting for machine breakdown, yet in other departments in that same factory dozens of jobs are waiting for labour? Further, a motion study analysis will invariably show that the inspector has to waste his time making calculations, adding up dimensions and looking up conversion tables, because the information is not on the drawings. How often is the finish of accuracy of surface finish on a job far in excess of that which is required, simply because no sample standard is in existence? How often do we find an elaborate drawing when a mere sketch would have been sufficient? Again on many occasions we find machine operators doing preparatory unskilled work or sorting swarf and pressing slugs from parts, because swarf or slug defectors have not been used. Observation will show that the majority of operators, particularly on assembly work, do really effective work only with one hand, the other being used as a vice or as a container.

There is one last point which I feel I must put to Mr. Jenkins. There is an advertisement in our local paper which reads: "C & A Modes, Ltd., fashion specialists, of Marble Arch, require youths aged 15 to 17 to train as window dressers." Well, when we do

not meet our production programme we often have to do some window dressing, but I think that the Ministry of Labour could do something to divert these young people to something more useful.

MR. JENKINS : Mr. Dyson has given us an indication that production engineers and the people for whom they work commit every crime in the calendar so far as the utilisation of labour is concerned. He referred to my previous background and to the fact that that may have some bearing on the type of training which is carried out. I must make it clear that I have nothing whatever to do with the training of labour. I do not control it in any shape or form ; all that I can do is to put forward suggestions, and whether they are accepted or not is a matter for argument. I feel, however, that any suggestions which you make here to-day are likely to bear fruit.

As regards the type of training, the Ministry have changed the picture a good deal. I say in my paper that to-day it is possible for an employer to lay down, in conjunction with the training section of the Ministry, a particular curriculum to give the training needed for individual employees. You can be of much greater assistance still if you will only attempt, as members of managements, to forecast your requirement to the Labour Exchange and let them know precisely what you are likely to want in a week, a month or three months—the longer the period the better—and let them train the labour. They will train them in your way and along your lines, and if possible on your materials so that when the training is finished those concerned can go straight into your works. In other words, you accept some responsibility for them, and that enables the Training Section of the Ministry of Labour to do one thing which frankly I am amazed that they have done so successfully, and that is try to anticipate and plan for something which has unknown factors. Everyone I know seems to expect that the Ministry will have on their doorstep the ideal person trained in the ideal way for the position they want to fill at a moment's notice ; but the first thing to know is what it is necessary to plan for. We have in certain areas a demand for fitters and in other areas we have fitters trained ; the unfortunate thing is that if we try to transfer the fitters to the places where they are actually required, it means moving men, and in many cases their families as well, to areas where accommodation is already very difficult to obtain. If you can assist the Ministry of Labour by letting them know what your future requirements are likely to be in the way of trained labour, and work in with them, you are likely to get labour trained for you.

With regard to the variation in methods to which reference has been made, I always prefer to see each employer train for himself,

when that is possible, because then there is no doubt that those who are trained can carry straight on with precisely the same methods when their training is over, and they will be trained in a way that the employer approves. I can hardly imagine any employer of labour standing for someone taking a piece of steel, scratching the surface and calling it machining, but the manager of the training centre has to make the best possible use of his material. He tries to make his youths or girls machine-minded. The actual material removed, therefore, is nothing compared with what it would be in industry. The turner comes away with the idea that he has been machining metal, and when he sees the actual speeds and feeds and the depth of cut employed in industry he is frankly amazed. The employer, on the other hand, can possibly provide scrap on which operators can be trained, and thus assist himself, the trainee and the Ministry at one and the same time.

Mr. Dyson mentioned one thing in which I am very interested and where I should like to see an analysis — waiting time. I should very much like to see everyone in this country for one week and one week only, make a return of the waiting time of labour in the factories of the country to-day. I think that if that were done the Minister of Labour would decide that he did not want 750,000 additional workers, and that all that need be done was to eliminate waiting time. If an analysis could be made of it, I think we should find that it is not altogether the factory executives that are to blame for it. The analysis might tell a very interesting story.

On the utilisation of existing labour I shall say no more than I have said in the paper. I feel very strongly that anyone who misuses labour is committing a crime against the interests of the country.

MR. W. SELLORS : In the criticism which has been made of waiting time, I think that production engineers are missing one point. The paper deals with the training of labour without commenting on the speed of training — the production speed. You will accumulate through that production speed the waiting time for which you are looking. In most up-to-date factories training is on the floor of the shop by the men in the shop.

There is not only the question of the training of the labour that exists ; there is the question of the loyalty of the people who are employed and their reluctance to train that labour. I have found in my experience over a number of years, in dealing with tool-makers, that some people will say that a toolmaker cannot be on piecework, because his skill comes first ; but I say that his skill coupled with speed is foremost. It is necessary to measure the waiting time, and, when you have measured that waiting time, you get an accumulation of your skill in the right direction. Your skill is classified and simplified by the progress of your type

of machine. A jig borer in the old days, when it depended on the skill of the individual for jig boring, is thrown on one side by an elaborate measuring system which will allow anyone with a period of proper training to produce something which is measurable and which can really go forward.

I notice that in this paper there is no mention of speed. Most engineering firms of to-day who have elaborate tools are very reluctant to produce those tools under some kind of system by which they can measure the productive quality. A die can be got out in a certain number of hours, and, if it can there is no reason for the industry to work any faster; but by measuring it you fill in the black spots, and those black spots are probably 50 per cent of your productive problem, or rather your productive value.

MR. JENKINS: I agree in principle with Mr. Sellors, but I must point out that this paper is not intended to cover what may be termed the higher-grade functional training of existing personnel within the factories; it was really intended to arouse the interest of all those engaged in the engineering industry in the necessity to train and to bring into industry the available mass of female and male labour. There are many aspects of the question of waiting time, but I deal primarily with waiting time of the type which is exemplified by waiting for materials, waiting for tools, waiting for instructions, waiting for machine setting and so forth, the hundred-and-one things which in many cases are within the control of the management but which in many other cases are outside its control. There seem to be very few factories to-day in which you will not find quite a large percentage of labour standing about for one reason or another. If you ask a question there is always an answer to it—they are waiting for this or that—but it is one of those things which we have to cure.

There are to-day many toolroom jobs which are in no sense commensurate with some high-grade jobs on aero engines, for instance, and therefore I maintain that we can and should, in these conditions, take much of the labour from the productive side to the toolroom. It might be an incentive to toolroom workers to work faster when they see what the production workers can do in dealing with what has always been regarded as toolroom work.

MR. TEMPLETON: One point on which I should like to hear the opinion of Mr. Jenkins is the doctor's certificate. I do not know whether it comes within the scope of this discussion, but I run a foundry, and for some time past we have been very gravely inconvenienced by men wishing to leave whom we are not willing to release. They go away and get a doctor's certificate, which says "Mr. Jones is suffering from the after-effects of influenza." One

takes every notice of a doctor's certificate, and it is a perfectly legitimate thing; but the climax was reached the other day when one of our foundry labourers applied to be released and we refused to release him. Two days ago he came back with certificate "Mr. Jones is suffering from _____. He is unable to follow his employment." That is the usual form, but in this case those two lines were crossed out, and underneath was written "Mr. Jones would be in far better health if he were in open air employment." I submit, with all deference to the medical profession, that every one of us would be in far better health if we were digging in our gardens, and I am wondering whether it is possible to bring pressure on the medical profession to see that if they do give a certificate there shall be every justification for it at the present time.

MR. JENKINS: You will realise that obviously I cannot give away official secrets, but I can say that this is a problem which is at present engaging the attention of the Minister. What his line of action will be I cannot say. So far as the certificate which has been quoted is concerned, the doctor must have earned his fee rather easily, because he told the truth and did not give the man a certificate which enabled him to secure his release.

MR. GRIFFITHS: Has Mr. Jenkins any data with regard to the number of trained females who have left industry to go to employment in, for instance, the bus companies and the post office, through higher wages being offered?

MR. JENKINS: Women have wandered, I know, from engineering to other industries, and particularly to industries which are allowed to advertise. That matter has been brought to the attention of the Minister not only by myself but by two or three other people, and I take it that it will be dealt with due course. Any points of that kind raised in this discussion will be brought to the attention of the authorities of the Ministry of Labour. A copy of the report of this discussion will be put before the Ministry, so that the matter will be brought up officially, but I cannot say what action the Minister will take.

MR. PAGE: We are all being pressed by the Admiralty and other departments to deliver our products quickly, but if we start a training scheme in the shops we have to make a certain amount of scrap and waste, and a good deal of the operatives' time is spent in looking after the trainees. What is the effect of that going to be, momentarily on least, on output, and how soon can we expect to get back to our normal 100 per cent? If two men are working in a shop doing a certain job, and a trainee is brought in, one of those two men must put in a certain amount of time watching the trainee, and the trainee is inevitably going to make scrap, so that in a small shop of that kind the output may be reduced by one-third. What is the effect going to be in a larger shop?

MR. JENKINS : First of all, I do not agree that the trainee must necessarily produce scrap ; I think it is purely a question of the method of training adopted. It may be that all the work of a given shop, carried out in the as-planned manner, would be finished work, but if in those circumstances I felt that I should get scrap from the trainee, I should let the trainee get machine sense, knowledge of tools and so on, leaving the finishing operations. That is usually a sound way of avoiding scrap. As a matter of fact, if that is done it usually leads to that procedure being adopted as a standard method, using low-grade labour ; and that is the basis of the memorandum issued by this Institution, on the utilisation of labour ; basically, that is the fundamental on which it is built.

As regards the major question let us take it that the whole country looked at that question from that standpoint and said "If we are going to train labour, we are bound to lose efficiency." If everybody did that we should be static, and we cannot afford to be static even in normal times, let alone time of war. We have to train labour. We know that we lose efficiency to some extent by the fact that we use one or more men, one or more machines for the purpose, but in wartime it is more than ever necessary that we should face the position and realise that we are going to lose output. There may be difficulty due to lack of knowledge on the part of Government departments, who definitely insist that people shall not be trained, because it is likely to lower the rate of output at least temporarily. That is a wrong attitude to adopt, because either output must remain static or the position must be faced. The sooner it is faced and the problem overcome, the sooner will a greater amount of output be secured ; and that is all that can be said about the problem.

The time taken is dependent entirely on the type of training which has to be given. Female labour in suitable shops becomes to some extent productive almost immediately ; when girls are put on suitable work with jigs and so on, they very soon produce as much as or more than is needed to make up for the loss of production by the operator who is supervising their activities, and in two or three weeks you probably gain about 60 per cent of the efficiency of the new recruit. This question of lost output, however, is not a thing which should prevent training being undertaken. If I were running a shop, my attitude would be : How many people do I want ? How many of those can I train ? Then I should work out the most efficient way of dealing with the situation. If I felt that the most efficient way was to train them all at once I should do so, whatever the view of the Ministry might be, and in my view that is the attitude which industry should adopt.

MR. PAGE : I should like to put to Mr. Jenkins the problem of my own company. He has said a great deal about the employment of women. Under agreements between the trade union and the employers' organisation, if we substitute women for men we must pay the women the same rate as the men, after a given period of training. In my company, however, we have a great many women who have been doing a very skilled job, but who are still on women's wages. If we substitute women for men in our factory, inevitably those women who are skilled and who are already there will raise great objection to the other girls coming in from outside and receiving the men's rate. We should like to be able to solve that problem without having strikes or other trouble.

MR. JENKINS : I am afraid you have put a question which I cannot answer ! I should like to ask whether your firm is federated?

MR. PAGE : Yes.

MR. JENKINS : Then I suggest that you go to your federation and ask them for the answer.

MR. PAGE : I have done so.

MR. JENKINS : If the federation made such agreements, I believe they were ill-advised ; probably they did not realise just what they were doing. Problems have been raised for which it is almost impossible to find a satisfactory solution ; I do not think that those who made such an agreement ever stopped to think of the huge mass of highly-skilled female labour at present employed in industry, and what the effect on them of this agreement was going to be. If you adopted the obvious course of bringing the existing women's rate up to the male rate, what would be the position of this country after the war ? I have great sympathy with many women in the engineering industry in this country who are very badly paid, but I do not think that this is the time by some hole-and-corner method to attempt to cure that. I know, however, that this problem is reacting on the introduction of women.

MR. F. H. PERKINS : I should like to say a word on the subject of the available facilities for training. I understood Mr. Jenkins to say that he was not directly concerned with that subject at the moment, but it is one of very grave concern to me as head of the production department of the Northampton Polytechnic that available facilities for training are far and away greater than the use which is being made of them at the present time. As most of you probably know, the technical colleges are working together with the Ministry of Labour in conjunction with the ordinary training schemes, and that work is going ahead, and as far my own institution is concerned it is going ahead satisfactorily ; but the effort which has been made by these institutions in connection with up-grading has at present received very scant consideration on the part of those who are using employees. I am thinking

more particularly of an effort which was made by grouping a number of capstans for the purpose of capstan-setting. We had a staff available quite capable of dealing with that subject. Those facilities have been known to the authorities for quite a long time, and yet there has been complete failure to take advantage of their existence. *I am sorry to strike a discordant note, but among the staff there is grave concern and considerable disappointment at the present time.

MR. JENKINS: I am very pleased that Mr. Perkins has brought up that point; otherwise I should have done so. It applies not only to the Northampton Polytechnic but to other schemes which the Ministry have attempted to start in various parts of the country; and I cannot understand the attitude of those people, who are consistently day by day asking the Ministry for setters of all types—automatic setters, capstan setters and so on—and who know that those facilities are available, who cannot do the training themselves, and yet who refuse to send suitable labour to take part in such schemes as that of the Northampton Polytechnic, by which they would be given suitable training, and indeed first class training, at no cost to the employer except for wages. The employer has to pay the employee his wages during the training period, but the Ministry pays for the training itself. The objection may be that the employer is paying for something which during the period of training he is not receiving. It seems to me, however, that with the present shortage of skilled setters, having in mind that intensive training is required, the scheme is worth the few pounds that it will cost the employer to send selected employees for training. Unless advantage is taken of them we shall have to abandon the schemes, and that will leave a nasty taste in the mouths of those responsible for technical education in this country. Even in peacetime we cry out about the dearth of proper educational facilities for engineering, and yet in wartime we allow facilities of this kind to remain idle. There is nothing that the Ministry of Labour can do about it, but it is sheer waste of money to send "green" labour to train on tool setting. Any firm who wants an employee who has been trained as a tool setter would prefer a man with a knowledge of its own processes and organisation.

MR. PERKINS: I should like to add that we have had no difficulty in getting suitable short-run work for these machines, and at the present moment I am employing girls to keep these machines running usefully, pending the time when people are available for training.

*The Institution, through its *Bulletin*, drew the attention of its members to the facilities offered at the Northampton Polytechnic and, as a result, these were fully availed of.

MR. L. C. MILLER : One of the difficulties in taking advantage of the training just mentioned is that, having paid wages during training the employer has no hold whatever on the operator, who may leave in a fortnight's time, especially in view of the various incitements to do so which still exist.

I should like to mention one point which may be of interest to Mr. Jenkins, because, after all, conserving the utility of labour is just as important as obtaining new labour ; I think we are all agreed on that, and most of us are trying to do both. The other day I found that we were two or three labourers short in the foundry and we could not get any more. I rang up a friend of mine who also had a foundry and asked him whether he was short of labour too, and he said that he was. We found that the cause of the trouble was that the local council was taking on 200 labourers for demolition work at £3 15s. a week. That sort of thing should not be allowed to go on ; if a local authority can offer any wages it likes and so withdraw men from industry, it makes a very great difference. Foundry labour cannot be done by women.

MR. JENKINS : I can only suggest that such a case as that which has been mentioned should be taken up direct with the Ministry of Labour to see what arrangements can be come to with the authorities.

With regard to Mr. Miller's first point, I think that, generally speaking, the average employer knows enough about his personnel to be able to select people who are likely to be loyal to him when they come back. There is no real difference between sending a man to a Ministry of Labour scheme and having him trained as a tool-setter and training him in your own factory ; there is just the same liability. I have been responsible for picking many hundreds of people for higher positions, and only in very few cases have I been dissatisfied ; I think that 99.9 per cent of those whom we train for various up-graded jobs of all kinds will be loyal to us and remain with us for many years afterwards. You have either to do without these setters or to train them in some way, and, as I say there is no more risk in sending them away for training than in training them yourselves, and you are unlikely to lose them if the conditions which you offer them are appropriate.

MR. J. E. E. BASKERVILLE : Mr. Perkins complained that not enough interest was taken in the scheme of the Northampton Polytechnic for training in setting. I happen to come from that area, and our chief difficulty is not training setters ; I do not know whether we are fortunate in that respect. Our main difficulty is that we cannot get operators. We do not want trained operators, but we want to have people sent to us, and we are quite prepared to train them ourselves, as we did in the last war. Boy labour, however, has dried up in our district, and girl labour is not available, so that we

are in a very difficult position. We read in the Press, moreover, that 750,000 men are to be taken out of industry, I should like to feel assured, therefore, that the Ministry of Labour will tackle the question of female labour wisely and see that it is provided for the engineering industry ; otherwise we shall be in a very bad position. We have lost about 120 of all grades, boys and men, principally through evacuation since the " blitz " in September last, and we have had about 40 people, some of whom are very indifferent, to replace that 120. If we cannot get women, what will our position be in the end ? That is our particular problem, and I think that it is a very serious one.

MR. JENKINS : Mr. Baskerville probably knows as much as I do about what it is proposed to do about this problem, because the Minister has told the Press more or less what he proposes. How successful he will be I do not know, but this is a problem of which the Ministry are fully aware, and they are doing their best to deal with it. Mr. Baskerville must be peculiarly fortunate to have no lack of setters ; I had better not inquire too closely where he comes from, or he might lose one or two !

MR. N. V. KIPPING : There is, I am sure, a mine of untapped labour in part-time workers, and this may be to some extent an answer to Mr. Baskerville's difficulty. We have a little separate factory which employs 300 women on assembly work in the electrical industry which requires varying degrees of skill—it includes a good deal of wiring work, and so on—and we have just started to staff the entire factory on the basis of a morning crew and an afternoon crew. The moment that we did this, we had an absolute flood of labour. Beyond question, there are very large numbers of women, some with experience of factory work and others without, who can give up a morning or an afternoon but not a whole day ; their home circumstances or other reasons do not permit them to work all day. Where circumstances permit its utilisation, I believe there is an almost untapped mine of labour there.

There has been a good deal of talk about the dissecting of operations and the training of labour, but there is another way in which the demand for skilled labour can be influenced, and that is by influencing design. Many designs look as though no production engineer had ever seen them ; they are surrounded with frightful limits, everything has to be turned, and so on. I believe that by plugging away at this aspect of the matter, little by little, almost component by component, it is possible to make a very appreciable inroad into the demand for skilled work in actual production. I do not think that that point needs elaborating ; it is sufficient to draw attention to it. If you keep plugging away at it the whole time, the final effect will be very considerable.

MR. JENKINS: The question of the utilisation of part-time labour is one which I know has received the attention of the Ministry, but it was felt that it was one of those things which must be left for the decision of individual firms, as to whether they could work on that basis or not. It may have some effect on efficiency, but it is better to have slightly inefficient labour than no labour at all.

I was very interested to hear Mr. Kipping's second point brought up. It is one which I myself raised with the Ministry of Labour, but the attitude taken, and I think perhaps rightly is that that is not a matter for the Ministry; they can do nothing direct there. It is a matter for industry itself to analyse its products and decide what alterations can reasonably be made, and then to ask for those alterations to be put into force. Our inspectors will always be pleased to give assistance in that direction and, if such suggested alterations are not accepted, it is possible for the inspectors of labour supply to bring the need for them home to the particular department concerned.

I agree with Mr. Kipping that this second point of his is probably the greatest potential labour-saving system available, and I should like to give illustration to show that that is so. A well-known truck was produced after being passed for production by American production experts, but it was gone over after the first truck had been produced, and it was found that 30 hrs. could be saved in manufacture. Since these trucks were turned out at the rate of 1,000 a week, that saved the labour of 500 skilled or semi-skilled men, on the basis of a 60 hour working week, every week of the year. When you realise that a truck already designed by production experts for production can be re-analysed in detail and so many hours of work saved, you can appreciate how much can be done with many of these designs which were not originally intended for mass production. By taking trouble it should be possible to save tens of thousands of hours a day. The answer which many may make is that this suggestion has been made in the past without result; but at the present time you will find that all the departments concerned—the Ministry of Supply, the Ministry of Aircraft Production and the Admiralty—are much more open-minded about these things, to such an extent that one or two departments have already sent out specialists to ask whether particular firms can suggest changes which will save material or time. I suggest that that is something which everyone should do as part of his normal routine.

MR. G. RILEY: I am concerned with the latter portion of the paper, which deals with labour troubles. About four months ago I was a tool turner, and also chairman of shop stewards. Whether my firm thought that I was a better tool turner than shop steward

I do not know, but they offered me the job of liaison officer between the work-people and the management ; in other words, they asked me to be a straightener out of troubles. In view of the fact that the paper deals with these matters, I think it is as well that production engineers should take them into consideration. Take the workpeople into your confidence, and you will get where you want to go. I know it is essential to secure the utmost possible production, but reference has been made in the discussion to tool-room workers, and I remember that in the two years following the last war I did only about six months' work because other people were brought in and trained. We have still to get over that. I have got over it myself, but we have to put it over everyone in the workshop and tell them that their skill is going to be looked after afterwards and persuade them that it is necessary that they should train others. If you by various methods gain the confidence of these workers you will even be able to overcome the difficulty which has been mentioned in connection with the agreement regarding women workers and dilution. I disagree with Mr. Jenkins about the dilution agreement, however ; I think it is a good scheme to keep men's wages as they should be.

MR. JENKINS : I will deal with Mr. Riley's last point first. I happened to be in a factory a few days ago—and this shows the kind of problem in this connection which faces production engineers and other executive personnel—in which this question was discussed. The factory employs a large number of women, and the question was what would happen if the wages of the women generally were brought up to the level of those of the women who were brought in to take on jobs formerly done by men. The immediate reply of the male labour was "Very well. The difference to-day between the rates paid to women and the rates paid to us is so much per cent. If the rates paid to the women are increased, we shall expect that percentage difference to be maintained." That was the attitude taken in that particular factory when the matter was raised with the shop committee, but obviously there are shop committees and shop committees. As a matter of fact, most live production engineers have been through the shop, and most live managers to-day realise that industrial relationships can be reasonably sweet and attempt to meet their workpeople on reasonably even terms. I think that if the shop stewards or others who represent the men in dealing with the management will attempt to see that in all cases the people whom they represent and the members of their committee act in a common-sense way and do not try to ride the high horse there will be no difficulty whatever in securing an extension of that sort of thing, and relationships would be much easier generally. It is the same with that, however, as with every-

thing else. There are a few bad shop committees who do not try to avoid trouble and to correct it but to create it, and they serve to scare many firms away from accepting anything of that nature or, if they do accept it, it is because they are forced to do so, and when anything is accepted under compulsion it never works very well. The fact that there is so much bickering between labour and employers is due to faults on both sides. I have been on both sides of the fence, and was a bit of an agitator myself at one time, but now I realise that it is possible to get many things by coaxing which cannot be obtained by kicking.

MR. LEWIS : Mr. Puckey referred to the new schedule of reserved occupations. For some time we have been training some apprentices, not under the orthodox indenture system, and some of those apprentices are becoming very useful to us. Some of them are now 18 years of age, and I should like to ask Mr. Jenkins whether he can tell us whether we are likely to lose them under the new schedule. Is the mistake which was made before to be repeated, and the apprentices who have been trained not left in the industry? Some of the men whom we have been training in this way will, we hope, fill very important positions in the next year or so.

MR. JENKINS : I cannot tell you what is proposed as regards apprentices, but a week ago I passed on to my immediate superior the suggestion that no apprentice should be taken for the Forces until he has completed his apprenticeship. In the great majority of cases they would be protected, and under the new arrangement any apprentices who work in a protected shop will be automatically protected. I agree with Mr. Lewis that all engineering apprentices to-day should be protected until they have completed their apprenticeship, and then, if they are eligible for protection under the regulations, they will get that protection. One of the worst mistakes the country could make would be to take apprentices for the Forces before they have completed their apprenticeship.

MR. S. V. HYDE : I should like to explore that matter a little further. I have listened to the discussion this afternoon with a rather peculiar feeling. It has always seemed to me that production engineers live in a very rarified atmosphere, and I have been confirmed in that belief this afternoon. I am connected with a general engineering works of some size, and almost nothing which has been said this afternoon is of any value to us. The breaking down of operations we have always endeavoured to do, but it is a strictly limited process and one very seldom gets a repeat set on anything. The introduction of female labour is also a possibility, although I do not look forward to discussing the subject with my shop stewards. But we have endeavoured, in full collaboration with our workpeople, to have an extensive apprenticeship scheme,

and I suppose that about 20 per cent of our employees are lads who are serving a definite apprenticeship. These boys now have to register at the age of 19; previously they had to register at the age of 20. I understand Mr. Jenkins to say that when they have completed their apprenticeship they are automatically covered, but that is the reverse of the position so far as we have encountered it. The schedule, as far as we can make out, is drawn up on the basis that the people of lesser skill are exempt at the earlier ages. There are certain jobs that a boy frequently does during his apprenticeship at the age of 18 which are exempted at the age of 18, and if a boy is shown as doing them he is exempted; but as the boys get older they should, for the welfare of the industry, pass to more highly skilled jobs, and we find that as soon as we put a lad on to a centre lathe or, as we do with the best of them, into the drawing office, he loses his exemption at once. That is not because he is not old enough to be covered; if you put him into the drawing office at 21, and the reserved age is 21, the Ministry say that when he registered he was 19, and therefore he is not exempt, and we have to apply for him on a N.A.S.D.A. form. That is not so certain as automatic exemption, and we have lost a considerable number who have been applied for in that way. I suggest that the Ministry of Labour should in re-issuing its Schedule of Reserved Occupations take note of the point that a lad who has studied and fitted himself for a better job and who is promoted to the drawing office should not be put automatically into the Army because when he registered he was 19; that is a wanton waste of effort and of skill.

MR. JENKINS: There is nothing more that I can add on that point. I have previously brought the whole question in relation to apprentices to the attention of the Ministry, and I will see that the point which Mr. Hyde has just made is brought up. It is possible that that sort of thing does occur; we have some very weird regulations at times. It is something which has probably been missed, and I will bring it forward as a separate point to the Ministry.

MR. R. J. BALSDEN: I should like to add that the instrument assembler is reserved at 18, whereas a fully-skilled instrument maker, who has done seven years' training, is reserved at 23. Instrument assemblers are ten a penny compared with instrument makers.

MR. R. S. HAYWARD: On the question of the possibility of retaining labour which is trained, Mr. Jenkins's reply was that it was more or less a matter of the loyalty of the employee. That we can understand when we are up-grading male labour, but where others are infiltrated into the industry we do not have sufficiently long contact with them to be able to place any great

reliance on their loyalty. Let me take a concrete case in my own firm. We deal with electric welding, and I understand from the Ministry of Labour that there are no training classes or courses for female electric welders at the present time. We are prepared to hold a course in our own works for this purpose, but we do feel that in view of the cost, which will possibly be £20 to £25 per person trained, there should be some protection given so that we shall not lose these people, when they are fully trained welders, to some firm round the corner who have been "sitting pretty" and watching us spend the money, and who are then prepared to pay an extra ½d. an hour. In the case of male labour, I believe that a man may not leave his employment without due cause, but I do not think that that applies to female labour.

MR. JENKINS: As I have said, I have already raised the question of the retention of the services of female labour, but what will be done about it, if anything, I do not know. Presumably any move which is made will be made in conjunction with the new regulations governing female labour, but the same point applies as comes in with regard to the retention of male labour; if you insist that a man shall stop with you and prevent him from leaving, within three months you will be wanting to get rid of him yourself, because he will not pull his weight. The main protection you require is that neither male nor female labour which has entered the engineering industry shall be allowed to leave it in time of war. The present form of protection is more a fantasy than a reality. The men know that you can insist on their stopping, and the consequence is that they do not move; but if a man wants to move and you prevent him, you will soon find that it would be better to let him go.

MR. DONNELLY: The Ministry of Labour are asking us to take in as much female labour as possible with the least possible amount of delay. In view of the fact that the factory inspectors are now closely allied with the Ministry of Labour, could not that Ministry see that the inspector shuts his eye to some of the things that cannot be done absolutely immediately? There are certain alterations in shops where male labour has been employed which have to be carried out before female labour can be introduced.

With regard to men leaving their employment, whether they be apprentices, trained men or dilutees, there is, I believe, the method of withholding the insurance card and sending it to the local labour exchange with a letter asking the exchange to do their best to persuade the man to return to his place of employment; but I should like to add that if the provisions relating to the protection of employment which are on the statute book were carried out, that would be unnecessary.

MR. JENKINS : The Minister is very much averse to the use of compulsion, and I am afraid that anything I might have to say about it would have very little bearing on what he might finally do. As regards asking the factory inspectors to close their eyes, I should probably be drawing attention to things if I mentioned it ! From some of the inspections of factories which I have made in the last six months, I think very many inspectors must be stone blind ! Some of the conditions that I have seen are terrible. As regards the other matter, I still think that the leaving certificate of the last war was definitely much more efficient than the present method, and it would not surprise me to find in a very short time that something of the kind was introduced ; but do not take that as an official statement.

MR. G. H. HALES : I think that this afternoon the Ministry of Labour has escaped a good deal of adverse criticism through having a man of the type and experience of Mr. Jenkins to speak for it.

During the discussion instances have been mentioned of arrangements which have been made between the employers' organisations on the one hand and the representatives of the employees on the other, a government department being a third party. I think that in those cases the Ministry of Labour, as is often the case with other government departments, is rather apt to deal with the employers' federation, eminent gentlemen who may not really be in a position to know what is best either for the industry they represent or for the employers. The schedule of reserved occupations, for instance, has no doubt been drawn up with the very best intentions on the part of the people who are dealing with it, but better results could, I think, have been obtained if they had gone to people engaged in the various trades. If you deal merely with the employers' organisation and the trade union, you are less likely to know the proper people to be reserved.

I do not think there is anything in Mr. Jenkins's paper which we can criticise. He is a very eminent production engineer, and we are fortunate that someone of his experience and ability has taken so much trouble not only to write a paper but to reply so fully to the discussion upon it.

A vote of thanks was carried by acclamation, and the proceedings then terminated.

Communicated.

MR. R. HUTCHESON : There is a trend towards the use of jigs and press tools made of wood and more particularly to wood impregnated with a synthetic resin. Since the wood is more readily worked than is metal its use offers decided advantages in the

making of tooling equipment for relatively short runs. In addition the use of wood opens up another source of labour, namely the skilled wood worker, such as the cabinet maker. There are a good many of these men available owing to the slump in wood working trades and there are instances where engineering firms employing cabinet makers have managed to train them up in this new class of work rather than stand them off.

Incidentally, where large jigs have to be handled by women or juvenile labour the use of wood in their construction naturally reduces the weight and makes them more suited for work by that particular class of labour. It is, of course, fully appreciated that it is not every class of fixture or jig that lends itself to fabrication from wood.

One point raised in the discussion was the need for installing suitable washing and other accommodation in works before women can be employed. Depending, of course, upon the works, this difficulty could often be overcome by temporarily allotting to the women employees the accommodation normally used by the office staff. Until additional accommodation is provided the office staff could share that of the works and since in many engineering firms this accommodation is of very low standard any objection of the office staff would have to be suppressed. It might make some of the clerical staff realise that there is a war on.

Mr. Puckey mentioned the very great need for production engineers to pass on to one another their own experiences and advice on labour and other problems. I heartily agree with this and also with the suggestion that the engineering institutions should be employed whenever possible as clearing houses for this information. In addition to the institutions the technical press could, of course, play a very important part in the dissemination of knowledge of this sort and probably reach a very greater number of the engineering public than could the institutions and I would suggest that the fullest possible use should be made of the engineering papers for this purpose. In the case of my own paper we are only too willing to do what we can in this direction.

Even though the war is on there are a good many relatively small jobbing shops that are not engaged on direct war work but who are, in fact, doing work of national importance. Many of these are engaged on repair work. These shops require a relatively large proportion of skilled men and not a hoard of technical executives controlling much unskilled labour. In considering the cases of works of this sort the greatest discrimination should be shown when it comes to attempting to remove their skilled men.

Discussion

Luton, Bedford and District Section

CHAIRMAN (MR. R. BROOMHEAD): You have all heard what Mr. Jenkins has told us, and what he wants us to do. I have no doubt there are a number of people in this room who can also tell Mr. Jenkins what they want him to do. I myself have noted one or two things, but I will leave them until the end of the discussion, because some of you may probably raise the same points.

MR. BULLOCK: Mr. Jenkins has, as usual, covered a tremendous amount of ground in a very short time, but there is one thing which strikes me as being very unfair. I understand there is a rule which insists on firms having to take people as trainees for a period of 12 weeks, but under no circumstances are they allowed to keep these should they desire to do so. The firms carry out this training in their own men's time, using their own plant, but even in the event of the firm finding that some of these trainees would be of considerable use to them, they are not allowed to retain them. I consider a firm, after training the men, should be able to retain those most suitable for their own requirements.

MR. JENKINS: I think you are entirely under a misapprehension. That is not being done at the request of the Ministry of Labour and there is no order issued insisting on firms doing anything of the kind. Requests are being made for firms to volunteer to take trainees. They can volunteer to take trainees on a payment basis by the Ministry of Labour, but only where an employer has already met his own requirements for labour is he asked or encouraged to set up such a system. It is only where the Ministry of Labour is paying all expenses that such labour is regarded as belonging to the Ministry of Labour.

MR. BULLOCK: The firm I have in mind is being paid a certain sum per week to train these trainees.

MR. JENKINS: If a firm is being paid by the Ministry of Labour for the purpose of training labour in order to utilise that labour in other places, you can hardly say it is unfair if the firm is not allowed to keep the labour for its own purposes. We are asking every firm to do everything possible to meet its own requirements by training labour at its own expense, but as in many cases works have been set up in districts where they have not even a nucleus of skilled labour to carry out such works training, it is necessary not only to find the nucleus of skilled men, but also to supply labour with some degree of training to fill the intermediate grade

between skilled and unskilled labour. The scheme you have outlined and also the government training schemes are primarily set up for this purpose and to that extent can be regarded as subsidising the training of labour.

MR. BULLOCK : This particular firm tried to get out of taking trainees but was forced to take them on.

MR. JENKINS : I should like to know which Ministry enforced it. Was it the Ministry of Labour or Ministry of Supply ?

MR. BULLOCK : I cannot say which Ministry, but the firm was not allowed to refuse, but would say it is engaged on work for the Ministry of Supply.

MR. JENKINS : If, having trained these people, a firm would like to retain them there is one way to deal with the matter, provided they can usefully employ them, that is by direct approach to the Divisional Controller, stating that they are in need of labour of that type. The most efficient way of meeting the requirement would be by allowing them to retain a percentage of the labour they had trained. I have no doubt they would be allowed to keep a percentage if they agreed to accept and train a similar number of trainees free of charge for the same period for which they had received payment for the trainees they were wishing to retain.

MR. BULLOCK : As conditions stand at present I understand they are not allowed to keep people trained under such schemes.

MR. JENKINS : You are bound to get that sort of decision when dealing with civil servants. The last thing any civil servant of the lower grades will ever do is to deviate from instructions laid down, but their word should not be accepted as being the last word. If, as I suggest, the matter be put clearly to the Divisional Controller, I have no doubt a commonsense decision will be made, but the facts must be clearly stated.

CHAIRMAN : It may be that Mr. Bullock has been misinformed as to how the firm in question came to take on these people as it may have been a case in which the Ministry of Supply visited the firm and found certain machines not fully manned. It may not have been an order but a request that they consider taking on and training operators for similar machines for a period of two or three months, the Ministry paying a fee for such training, so that the trainees could be transferred to some other sphere of operations. It may be that the firm had vacant machines but insufficient orders to fill the machines at that time.

MR. BULLOCK : They could not get labour to fill the machines for the full 24 hour day. Apparently the Ministry heard of this and compelled them to take trainees.

MR. JENKINS : I think you have been misinformed. If the firm accepted people for training and were paid for carrying out that training they could not grumble at not being allowed to retain

their services. I think it definitely points to the fact that the firm were remiss in the first instance in not taking on, and training at their own expense, labour to meet their requirements and that having found that it was possible to train quickly suitable people they now wish to retain people trained at the government's expense.

MR. BULLOCK : On that point I would not like to argue. I know the firm put forward the excuse that it would mean robbing their men and plant to train these trainees and under these circumstances it was not fair to take them away when the training was finished.

MR. JENKINS : I must say I am very glad to find out any weaknesses there are. It is much more efficient for me to get complaints than for me to express personal opinions.

MR. JUKES : During your lecture you mentioned the use of simple jigs, etc., and I would like to stress a point that rankles somewhat in my mind. We very often have articles or components to produce to certain limits, and in many cases, after doing all kinds of things in an endeavour to work to those limits, we finally come to the conclusion that we cannot produce the parts to the limits allowed and we then get concessions. I fail to see why we cannot get these concessions in the first place. I have in mind a case where we manufactured a particular component, and it was turned down because we were two thous. small. A few weeks later we had some forgings and we could not machine them to the dimensions called for. On taking the matter up with the Ministry of Supply, asking for correct forgings, we were told we could work to within one tenth of an inch. That sort of thing is not helping production. We are used to working ourselves knowing the maximum limit we can take. I consider a lot could be done to increase production by increasing the limits to the absolute maximum.

MR. JENKINS : To deal with the question of concessions first, you will find the attitude of the various departments very different to-day than it has been in the past as regards tolerances. If you make application for a change of that nature in a case where from your own particular knowledge of the problem you are convinced that such a change is essential you would probably get that change. I say change, not concession,—concessions are bad. Some firms are still of the opinion that they are the only people concerned, and this is no good from a national effort point of view. I am in agreement with changes but not with concessions. Where you have cases of that nature and are convinced that a change would be desirable from a production point of view I would suggest that you call in the Divisional Inspector of Labour Supply and ask him to investigate it for you.

MR. JUKES : I know we can do that sort of thing, but I still think maximum limits should be given in the beginning.

MR. JENKINS : You must realise, of course, that the same things occur in industry and that government departments are no worse sinners in this respect than industry. Everybody in industry has probably known cases where their own designers have done the same thing. Many things called for by the government have been designed by people not the least bit interested in manufacture, but we cannot stop the war whilst we change them.

MR. JUKES : We are discussing the efficient utilisation of labour and in cases where we are asked to work to small limits where larger limits would do, we are using far better types of jigs than we need, and where we could use much simpler things and save time.

MR. JENKINS : You must, of course, remember that when these things reach you they have been designed and you are probably not the only firm affected by this design. There is a huge volume of articles in production and to ask a government department to re-design in such cases is just hopeless. I believe the the Institution has put before the Production Council a memorandum drawing their attention to this sort of thing and a small committee has been set up to work in conjunction with the government on any changes in design from the manufacturing standpoint. To ask a government department to re-design when an article is in production is hopeless.

MR. JUKES : They will give you a larger concession for your own firm only.

MR. JENKINS : In such cases as you mention I should advise you to bring them to the attention of the Divisional Inspector for labour supply and attempt to get a change. It would be a change rather than a concession.

MR. ERICSON : I think we all agree that we must use female labour. The firm I represent has for many years adopted that course; 40% of our labour, skilled and unskilled, is female labour. We have a lot of unskilled labour amongst the men. We of course have highly skilled men such as electricians, millwrights, etc., about 120 in all, but that is not a large number when you consider that we employ about 4000 workers. What I am particularly interested in, and I think a good many others are interested in the same thing, where and how are we going to get this female labour? I know in this town there is plenty of female labour about, but the question is how are we going to get them to accept jobs in the engineering industry? It is, of course, unfair to ask Mr. Jenkins what is the intention of the Ministry, but something must be done to attract them. We find, like many others, that we get a lot of women in, some stay two hours, some one week, some come in for a time, then go out, and later come back. This is a problem that

has to be faced, and unless something is done to make it clear to everybody that the engineering industry must have female labour, we are not going to get them. Our particular industry is one where female labour is quite suitable, the machines are all suited to the job, semi-automatic, and female labour is the obvious source to draw from but it must be forthcoming. I hope Mr. Jenkins can tell us something about this, as in this district we cannot get what we want.

MR. JENKINS : The state of affairs you mention does not only apply to Luton, and the question of female labour is being considered on a national basis with a view to ascertaining what action can be taken. As you know, Mr. Bevin is very loath to use those powers which were granted some months ago by Parliament. His view is that he would better solve the problem by voluntary methods rather than compulsory, as you get a better interest that way. Most of us know if we make labour compulsory that we are not likely to get that spirit we like in the factory. There is, of course, another angle, if you are to utilise properly female labour even in Luton, you come up against one of the snags which have been met with in other areas, and that is ; Where can you put these women if you bring them in from outside ? I think, so far as possible, women will be drawn from local sources, even from the home. I must say I think the Ministry are partly to blame for the present position. Constant speeches were made saying women were required in their tens of thousands, and many offered their services only to find that their services at that time were not required. Many women were prepared to go into industry. One of things I have suggested to labour supply inspectors is, when they visit your factories, to ask what number of people you can take on untrained over a given period, and over the next three months how many women can you take, also if you take them can you train them ? We all know women are going to be required, but at the present moment the training centres are only half full, and in some areas there has been difficulty in placing them after they have been trained, The Ministry is now trying to set up training schemes so that they will be trained to suit requirements ; I think they could be trained as A, B, C, D, or E, for a particular job of work.

MR. ERICSON : What I had in mind was cases where industry, not engineering, has drifted in here, I consider unnecessarily, such as cigarette makers, etc., who have evacuated from London. Some of these firms are in a position to take labour in a way the engineering industry cannot do. That was the idea in my mind more than anything.

MR. JENKINS : I think there is a specific report from this area that certain firms are attracting women, and as regards the drift

from engineering to these firms, some steps must be taken to prevent it. The job is, of course, to get them back. You must realise that Mr. Bevin has these powers, and as a last resort he can apply them to engineering factories if he feels so inclined. An inspector will be able to order women definitely to be transferred from these factories to the engineering industry.

MR. BULLOCK : Would it help to encourage women if you had some sort of uniform ? They have uniforms in the Auxiliary Fire Service and Civil Defence. A uniform might attract them quite a lot.

MR. JENKINS : I will bring the point up, but personally, I hope our women have not quite got to that state.

MR. BULLOCK : As regards this order of 40% skilled labour, is that to be rigidly enforced in every factory ?

MR. JENKINS : This question of percentages is one that has obviously been got out by statisticians, it is the only way in which the problem can be approached. A committee has been set up under Sir William Beveridge which has been checking this thing up on a particular basis. These statistics can only be applied to industry as a whole. In talking of 40% it only applies to the industry as an industry. I pointed out the fact that skilled labour which at present averages 40% has got to be reduced to 30%. If you look at that in a broad sense and every firm was made to release 25% of its skilled labour, and that skilled labour was suitable and could be drafted to other areas where the percentage of skilled labour was on an exceptionally low basis, that would clarify the position and put the industry on a sound basis. Some firms may require 50% or even 55% of skilled labour, whilst another firm could run with 10%. If you start applying these percentages we should have some firms asking us for skilled labour to make up their 40% even though they did not need it. In talking of these percentages it means nothing except the reduction which has got to be made in skilled labour in industry generally. It means that one man in four has to be replaced by unskilled labour. We know that we have got to absorb three-quarters of a million people in the engineering industry, and it has got to be three-quarters of a million unskilled people. We have got to spread the skilled men available to the extent of taking one in four and bringing in unskilled labour. You have got to increase the amount of unskilled labour, but percentages are merely the general principle which has to be applied to the industry.

To refer to labour in terms such as unskilled, semi-skilled and skilled is really incorrect and I feel that one only liken the skill grading to a rainbow. After a short experience the operator may be regarded as having entered the first primary colour of the skill

rainbow and his progression is a gradual process as represented by the ever changing colour scheme, but no one ever goes right through the rainbow, in other words, no one person can perform every skilled job in the country. The degree of skill of individuals is like the colour scheme in the rainbow ever changing and getting wider in scope.

Really, to talk of a given percentage of unskilled, semi-skilled and skilled labour is so much "tripe," for if 10 people tried to define a skilled man we should get 10 different definitions, whilst if one took different tool rooms the skilled percentages would vary in every one.

A return has, however, been made by industry of the labour it employs, subdivided into the three broad classifications, skilled, semi-skilled and unskilled, and this return is the basis upon which the percentages referred to have been arrived at. I quite realise that in redistribution we have difficulties which no form of statistics can take into account, as a man regarded as skilled in one factory may be regarded as only semi-skilled in another, owing to the differences in manufacturing methods, equipment and product.

MR. VALLANCE: I think it will be agreed that the trouble we now have as a nation has been due to bungling for years. The nation has been run on a basis on which no private enterprise could be run. I claim the right to say that as a voice which has been ringing as long as five years in the technical press. Even in peace time, shortage of labour in the tool room, or a trend towards a shortage, was equally evident. A boy wants to be a precision tool maker, he goes to a technical institution and takes an engineering course. He begins to learn to draw something, he learns algebra, mathematics, etc., even if he does not intend going further than the tool room. He eventually finds himself in the shop with knowledge that he is never called upon to use. I contend that as regards education, first of all teach the boy by apprenticeship with a tool-maker, then going on to draughtsman, then production engineer, and then probably manager. In that way you have no waste. He is at least gaining immediate knowledge from the technical point of view even if he goes no further than the tool room, and if he does decide to go further he can continue his education. I note you suggest training unskilled labour in training centres run by government departments, but I think it would be much better if this training was done by the individual company. There is a difference in training received at government training centres and technical colleges and training given in the shop. Practical training can only be acquired on standard machines, whereas a great percentage of training given in colleges is special. The best place to train any unskilled labour is in the shop. In every firm

a responsible man should be concerned with labour economy. It should be a job apart from the manager, as it is a job for one individual on its own.

MR. JENKINS: I must say I agree with your outline as regards education. I have never agreed with the methods of technical education in this country, but that is a subject which can only be tackled by the industry itself. The industry should let the authorities know what it requires rather than accepting something which the civil servant offers. I have said in the paper quite plainly that the civil servant is too prone to force on industry what it thinks industry requires rather than supplying that which industry itself knows it requires. It is only when industry with one voice says what it requires that it will get what it wants. Of course, what any government department does will only just touch the fringe. You will not produce a millwright in any training centre in the country, the teaching has got to be done in the shop. As regards the training of labour under present conditions for the purpose of this munitions plan, first of all, practically all the labour we are going to absorb in this period will be removed at the end of the war. All of us know full well that the volume of business which will be available at that time will certainly not entitle us to utilise the services of these people. At the present time they are wanted for a national emergency, but agreements with the unions insist that these people shall be removed. It is therefore in the best interests to make them efficient production units as quickly as possible. It is suggested that wherever possible firms should carry out their own training from unskilled labour. Some firms cannot do this without affecting their own output. Machine sense can be obtained at government training centres, and the idea of government training centres is to produce a reasonable degree of skill. I want to point out one thing, however, that if all the government training centres and all the technical institutions were completely utilised to their utmost capacity, considering the fact that we have to absorb 750,000 people in eight months, three-fifths of them have still got to be trained in the factories—three-fifths has got to be done by the industry itself. I think the more the industry is prepared to carry out these schemes of training for themselves, the better. What I have endeavoured to do has been to change the viewpoint of the Ministry of Labour as regards training. Instead of training people on the lines originally laid down, they are now prepared to train people in the way and in the methods in which employers want them trained, so far as their capacity will allow them to do so. You should therefore go to the training centres and say "I want twenty people trained in this particular way or for this particular machine." If you, for instance, wanted them trained on

a No. 4 Herbert you could specify that. Operators in government training centres can be trained in the rudiments of setting, but it would be rough and ready. Much good work can be done at the training centres, but it is of course impossible for them to cover all the industry requires—no civil servant could deal with it, I could not deal with it, it must be arranged by the industry itself. Unless industry itself does take interest in these training centers and training schemes we are not going to get very much benefit from them.

MR. ARMITAGE : A point that interested me was as regards trainees having varying degrees of training. In all the trainees that I have come into contact with I could not make out what the training consisted of. These trainees were dumfounded when they came into the shop. I consider they ought to be given a type of training, such as turner, fitter, grinding operator, etc. All the trainees I have come in contact with feel quite lost when they come into a shop.

MR. JENKINS : That is a job for you. I want you to carry this message to the firms you represent. If your firm wants 10 grinders, if your firm will go along to the government training centre of the local labour supply and say, "We are prepared to accept from you 10 grinders, if you will carry them through this course we will take them from you." You must remember the Government training centres were set up for one specific purpose in peace time, which was taking people without any hope of employment and getting them into industry. For peace time that was probably fairly sound, but from the standpoint of war methods it is quite useless. It is, of course, no use some one in a Government training centre training 20 grinders and then find he cannot place one. Every time you have, say, 12 people trained for a particular thing and you take them into industry the demand has been lowered by twelve, and in that way you have helped yourself and you have helped the country. It seems to me that you want some one from the production engineering side who understands the various phases of the business to set up the type of training you want. At present the Government training centres are prepared to have these people trained in any one thing. You cannot have a better offer than that, and you should take advantage of it. If people will not tell us what they want, they are not interested.

MR. JOYCE : I was very glad to hear what Mr. Jenkins has said. I quite appreciate that if any one adopts the right procedure, he can be very well satisfied. One thing I would like to know, is there any prospect of employers being able to retain the services of people trained on these lines ?

MR. JENKINS : I think, probably, methods will be adopted which will prevent people moving, but there are of course times

when you want to move people. If a man is disgruntled you probably want to move him. If you want to retain a man's services, you have always got this method of dealing with labour that wants to leave: You have no necessity to hand over the man's cards. If you want to retain his services, you can tell him you are returning his cards to the local labour exchange. You then send the cards to the local labour exchange with a note to the effect that you wish to retain this man, that he is leaving against your wishes, and that you want him to return to your employment. Every effort would then be made to get him back to you. If the local labour exchange is satisfied that he is a useful employee to you, they will come along and ask some questions, and they will have to use their discretion to decide whether it would be better to allow him to go. I would mention that in numerous cases of this sort the local labour supply inspectors have been very successful. In some cases it has been necessary to point out to the firm things they have not known. In most cases people leave because they have a grievance, and in many instances the employer loses a valuable servant where the whole thing could have been cleared up in 10 seconds if he had known the circumstances. The man may be in a particular section where the foreman has just got it in for him—these things do happen—or it may be something or other where the man feels under a sense of injustice and decides to leave. If the employer is aware of the cause he may move the man into another section under somebody else and so retain a good workman. In a case where it is the fault of the foreman, the employer should call the foreman in and tell him he is losing the firm valuable labour, and is therefore a bad servant himself. When dealing with people in industry, common sense must be used and people treated as individuals. I know quite well from personal experience if you handle labour that way you will not get much trouble. In forty years experience, with 26 years supervisory, I have had very little trouble in that respect; it is largely a question of the man himself. Under present conditions men are rather more inclined to be "ticklish" than in normal times.

MR. NAYLOR: I have heard a lot about these training schemes but am still not convinced that we have gone about this business in the proper way. I think the Government should have subsidised and made the employers supply their own training centres. Unfortunately, not many employers trouble about training in normal times. As soon as they get people in the factory they want them into production, taking the attitude that even at only a few pieces per day, it adds towards the final figure. I would like to give my experience. I was with a London firm which employed 1,500 people, the discipline was very severe, every job was split to its

very finest limits. About seven years ago we instituted a training scheme. We started off with about £20 per week, and then it grew to £80 per week. We had the same trouble as others have experienced ; some of the people came in, had a look round, did not like the surroundings or something of the sort and said "We are not going to work here," and went at lunch time. Eventually we decided to set up a school. We laid it out in class room fashion with one machine for this and another for that and it was a big success. This training covered about 20% of our cheapest female labour. We put these girls in the factory after one or two months in the school and they had attained about 75% efficiency. About 75% of these women went into the shop, went amongst the other operatives, and kept on the job. We made sure we did not lose many people put in the factory. We went up to £5000 per year with female labour and found it worth it. I think if a factory finds so many machines, say two turning machines, a milling machine, a drill etc., they can train people to suit their own special requirements in their own shop. When a man has been trained in a certain way in a certain shop he generally gets a liking for the shop, and it is better to retain him in the shop rather than sending him to some other place. I think in that way firms can calculate the number of people they want over a certain period and train them. I know there are all sorts of objections, but I am not convinced that every factory could not solve its own needs if the matter was tackled in the proper way.

MR. JENKINS : I think most people would agree that would be the ideal way, but you are up against two things. In the first place, nobody knows five or six years before when war is going to break out, and, in the second place, when it does break out you find there is an extreme shortage of machines and also an extreme shortage of skilled men. You can say this war did not really start until the invasion of Belgium. When the war did start we found we were short of everything, and any suggestion or insistence that firms should take machines from their already depleted resources for the purpose of training instead of output would have met with a terrific outcry. The only thing any government department can do at the beginning is to use the system they have in vogue. Whether that system is right is neither here nor there. At the present moment I do not think any discussion along these lines will get us far. I think all present training should be for immediate requirements instead of in any haphazard manner. What the whole country wants to do is to get all possible labour turned into productive units. The next thing is to convert or move up the present labour to one grade higher. In that direction, if industry and the training centres pull together, some very useful work could be done. I think the problem of the factory to-day is not so much

the absorption of unskilled labour as the one of finding sufficient skilled labour to handle that unskilled labour, and to produce the necessary tools, jigs, etc., to use such labour. The thing you are more concerned with is whether the methods outlined in this paper, which seem to be the only methods available are practical, and can we use some of these people as tool room people in cases where you have ones or twos off. I know full well that unless you can strengthen your tool room and increase the number of your setters, you are not going far in the absorption of 750,000 people. Then there is the question of the shortage of material. Although I am talking as a private individual I am a member of the Ministry of Labour, and I am interested in this phase of the question. The Ministry of Labour have requested their inspectors to obtain all the information they can, so that they can come back and say: This firm is efficiently managed, or efficiently tooled as far as tools go, but they have a definite shortage of materials. The Government departments must get together and get cohesion. If we could go to the Government department concerned and say, "In Great Britain yesterday we had 250,000 firms employing so many people, but five per cent were standing idle waiting for material" then we should get some movement. When I complain there is material shortage, I am met with "There is not any material shortage." I know very well there is material shortage, all of you know we have a certain shortage. Let us set to work as if engaged on one problem and each do his best to assist the other. I am particularly interested in your view as to whether it is reasonable to say we can up-grade labour in the manner suggested. I should like to know your feelings and whether you have any suggestions.

MR. RUSHTON: Mr. Ericson raised the point as regards the difficulty of obtaining labour, and the difficulty of labour being diverted from non-essential industries. Firms do not wish to lose their employees, particularly if they have been in their employ for a long period and there is no real incentive to ask them to do so. These employees are trained for and used to a particular job. Some of us believe that the war will not last very long, and firms naturally want to keep the labour they have trained for their own particular industry. I do not think a solution has been dealt with at all. Personally, I think one solution would be a reduction of the excess profits tax by a small margin—it need only be by a small margin, thus giving these firms some incentive. I think a lot of labour could be released in that way.

MR. JENKINS: The Ministry have power to transfer people from non-essential industries, and they can apply that order if they feel so inclined; they can actually close down any firm. What would actually happen so far as such firms are concerned is this,

in the near future they will be told what they have got to do in the way of reducing staff. A check will be made on a given industry, and it will be told "The output of your industry has been reduced from 100% to 60%, and you must therefore release 40% of your labour." As far as the excess profits tax is concerned, I must say I do not agree with it; possibly a reduction may have some small effect on people retaining labour, but I do not think that cuts much ice. So far as non-essential industries being reluctant to lose their labour is concerned, immediately the war is over that labour will become available again, it will not want to stay in engineering, and it certainly will not be wanted in engineering; the agreements with the unions insist that it shall be removed from engineering when the war is over. I do not think we shall get the E.P.T. taken off; we may get it reduced, but I do not think it will be taken off. I think something may be done with it in the future, but not for the reason you mention. The main way in which we are losing labour is that employers feel they have a certain amount of loyalty to the people who have been with them for many years, particularly if that labour is prepared to work shorter hours whilst their industry is bad. I think one way to overcome this would be to issue an order to the effect that no one could employ labour unless it could run so many hours per week. Say you must employ your labour 50 hours per week or reduce the volume of labour.

MR. VALLANCE: I would like to stress the point that in a great percentage of engineering manufacture you make a piece big and then bring it down to the required size, and skill of high degree is only used in the last few thous. If you want to economise in skilled tool room labour, speed up operations so that the highest type of labour is only used on the finishing processes. The designer, or a super-designer, ought to be able to do something about it in the designing.

MR. JENKINS: I am glad to hear that you feel with me that we can reduce labour in the tool room. There are many tool rooms where the rough work could be done by unskilled labour, and I think that could become a consistent operation of the industry.

MR. VALLANCE: I think the best method in normal times is for the toolmaker to follow through all processes and finish the job himself, but at a time like this we should do all we can to help and a lot could be done in the tool room in the way I mentioned.

MR. WALTERS: I am entirely in agreement with the last speaker. Any tool room can be split up between skilled and semi-skilled people. I myself have run a tool room with 40% skilled, 50% semi-skilled, and 10% none effective. I see no reason why it could not be done that way.

MR. JENKINS: One of the present conditions is a shortage of

labour in toolrooms in the various factories, and the result is that special tools, jigs, gauges etc., are not available. This has led to the unsatisfactory position of firms saying "We cannot get tools, gauges, or equipment, so we must get skilled labour." This takes longer to produce things than had jigs, tools and gauges been available. That is the position in many cases to-day.

MR. BULLOCK : Following on what Mr. Jenkins has just said. It would help a great deal at the present time if the Government would place orders with certain firms for a certain article for the duration. The firms making the articles would get used to them, it would ease the position as regards jigs, tools and gauges, and would automatically solve probably 50% of the labour trouble. Firms always dilute up to the limit of their capacity,—they do not need to be told to do it. If firms were given orders to make a certain article for the duration, it would automatically solve a lot of trouble.

MR. JENKINS : The allocation of orders has, I believe, been taken up by the War Emergency Committee of the Institution, and that point has been stressed. I may say that any point of interest to a department will be taken from the report of this discussion and sent to the department concerned.

MR. ERICSON : As regards the question of material, this is very largely in everybody's mind at the present time, and the question of the shortage of material is one that should be dealt with, as it is as essential as the labour problem. I know the position of this as regards our firm, but our firm is in a unique position in its way. As regards the training of labour, I will tell you our experience. I will not say it is tool room work, our tool room is really gauge work. It has been our policy never to ask for people from outside sources if at all possible. We start with raw labour and turn out efficient operators, I do not think we have more than 1% that came from outside, they are all trained in our own works. We have had a little experience with training schools, if you can start with a small school and extend that into the shop, and if the same people who have trained such people are allowed to deal with them it is a very good scheme. When first I tried it all the foremen were adverse to the scheme but it was justified by results. I found it best to train people on the machines they were eventually going to use.

MR. JENKINS : If you can train people on machines they are eventually going to use it is certainly an advantage. Where you get a transfer of labour from one factory to another you have changed the conditions. Immediately a person changes from one organization to another he feels like a fish out of water. In a new organization things sometimes run awkwardly, and you begin to wonder whether you are half as good a man as you thought you were.

CHAIRMAN : As to the point Mr. Vallance raised as regards tool room work and a man getting a job and completing it himself, I hope he does not tell me that such conditions prevail in his works.

MR. VALLANCE : Such conditions do not prevail at the present time.

CHAIRMAN : If you want to make a tool room man happy, give him the best work and see it is finished as it should be finished. No modern tool room to-day is run on the old fashioned lines whereby the foreman gets a drawing and hands it to a toolmaker for him to do the complete job, including milling, grinding, turning, etc.; those days have gone. To-day you can take a tool with 53 parts belonging to it and everyone of those 53 parts are made for the toolmaker, every piece of the tool. He may have a lot of time to spend on the die, but the bench shaping machine will finish it as good as any toolmaker can file it; therefore the grinding is done, the hardening done, the turning, etc., done and he has only to finish it. You have simply to use the skill of the toolmaker for the final finishing. I believe one member of the audience is afraid he will experience difficulty in trying to get young apprentices in his shop to do work for the skilled toolmaker, but if tackled properly, I do not think he will have any difficulty at all. As Mr. Jenkins knows, practically 90% of any job is semi-skilled or unskilled labour. One of our members has mentioned how disappointed we are with the trainees who are coming into our works. One could not face up a blank on two sides. As a matter of fact, that particular trainee could not face up a blank anything like parallel in a reasonable time. We are finding these trainees are capable of doing this type of work when they come into our shops. We now learn, however, that employers can send representatives to the training schools to see what the trainees are doing. I understand they can take work along, see the individual, leave the job with a man responsible, and later see what progress that man has made. If the man has made a good job, I believe the employer can ask for the trainee.

MR. JENKINS : There is a little misapprehension. What I want you to do is to decide you can absorb a certain amount of labour, say so many fitters, turners, millers, etc. You want the Government training centre to train them for you. You tell the training centre through the local employment exchange that you wish to have this labour trained along the lines to be specified by you. I want the training centres to train men to meet your requirements. The work can be laid down and selected by you and you are in a position to check it up. As regards material, they cannot use productive material in a normal way, that is one of the things the unions are adamant on. They will not allow articles to be produced in government training centres by labour paid at trainees rate. If articles are made for use in training centres the men must be paid

union rates of pay. If, however, trainees were being trained for a particular firm, using that firm's own tools, equipment and material for it, they may be prepared to stretch a point.

CHAIRMAN : Are we to understand that the work being done by 1,500 people at Letchworth is not work of national importance ?

MR. JENKINS : That is the position to-day.

CHAIRMAN : My point is correct you can send a production job to the training centre and see it done. With regard to up-grading, that is a point that we all want to take advantage of, and do all we possibly can to help. In cases where you can up-grade drillers to millers, rough fitters to fitters, or fitters to toolmakers, it is essential that we should do so and take full advantage of it. We must give all possible help to the Ministry of Labour and the Ministry of Supply. In many towns, as in the case of our own town of Luton, there are a lot of small factories employing people who are really semi-skilled engineers. I think we could get a lot of semi-skilled labour from such factories if we searched for them.

MR. JENKINS : These factories have been visited and the type of work being done has been taken into consideration. They have not kept labour which could be transferred. If you have information to the contrary, you know where the labour supply board is situated.

CHAIRMAN : I think a lot of the hat manufacturers in this town have the type of man we want.

MR. JENKINS : At present no one has power to take a man from the hat industry and push him into engineering ; some change must be made before you can do that.

CHAIRMAN : The men I refer to make moulds, repair machines, do without calling in an electrician, and in fact do all their own repairs.

MR. JENKINS : You must, of course, take into consideration that by taking a few men from special industries you could put probably 4,000 men out of work, and a large percentage of that industry may be for export. If you know cases where factories are employing engineers they could really afford to lose, you can bring these cases to the attention of (1) the local supply officer, (2) the employment exchange, and (3) any inspector of labour supply.

CHAIRMAN : Mr. Jenkins has not tried to tell us that firms in this country are short of material, he only wants us to remind him.

MR. JENKINS : If you are short of material or know of bad cases of shortage of material, I want you to tell the inspectors of labour.

CHAIRMAN : There are a lot of people on work of national importance who are short of material ; to wait three months is

nothing. If Mr. Jenkins wants correspondence to prove this he can have it.

MR. JENKINS : I would say it has been suggested that in future in bad cases where people are being held up simply owing to material not being available, that we should withdraw the labour as a protest. I believe there is more labour being wasted due to non-available material than to anything else.

CHAIRMAN : If you had 15 operators held up one week for material would you withdraw that labour in such cases ?

MR. JENKINS : At periods, regular or irregular, we find plants being held up for material, I can point to places who are losing one week in four because of non-available material ; those are cases where labour should be withdrawn as a protest.

A vote of thanks to Mr. Jenkins concluded the proceedings.

Discussion

Cornish Section

MR. J. G. YOUNG : (Section President, who presided) : You mentioned, Mr. Jenkins, a figure of 750,000 extra employees in eight months. Does that date from last July ?

MR. JENKINS : As from September.

CHAIRMAN : So then we have got about two months to go to get this total, thank you. Is it possible to know whether there are more people engaged in engineering to-day than in say, 1917-1918 ? I heard you mention the dilution of tool room workers. In the last war screw gauges, very accurate ones and Johannsen type slip gauges, were produced by women, hardened and lapped within N.P.L. standards at that time. Is that being done to-day ? The screw gauges were made on machines which were direct copies of the Societe Genevoise thread correcting lathes. A further point I should like to know is, where do we draw the line to-day as to the work women may be employed on, that is as regards their physical fitness ? You mention in your paper, planers, slotters, radial drills, etc., That seems to me to be fairly heavy work.

MR. JENKINS : The total number of people engaged in the engineering industry is regarded as essentially secret, but I will say, that there are many more people engaged in the industry to-day than there were at the peak of the last war. This is amply justified by the difference in degree of industry in this war and in the nature of the products used. As regards tool room work and screw gauges being manufactured by women, I think you probably know that they are being manufactured by women but not by the same method which was used in the last war. I find, after inspecting the labour supply in various districts, a distinct tendency to bring women into tool room activities and one of the particular applications seems to be grinding, but I think we can draw a parallel between tool room work and the class of work many of these women are doing with firms like Rolls-Royce, because much of the work which is being handled by them is to a degree of accuracy which is equivalent to standard tool room work. There are limits as low as $2/10$ ths of a thousandth and I saw a profile gauge which had actually been finished by a woman which was as good a job as I have ever seen. The particular woman was exceptional, being cultured and possibly of higher education than the average factory worker.

As regards the line of demarcation of female labour, in the present emergency we must use women wherever we possibly can (i.e. on

work which it is reasonable for them to carry out without physical injury) because it is going to take many more men to maintain the mechanical equipment of the forces over the next twelve months than at present, so we have got to lose a certain number of trained engineers. It is therefore, more and more necessary to utilise women. I think this question of what women are suitable for is largely dependent on the location of the industry. In the Midlands, women have worked in the engineering industry for such a long period, that it is inbred in them and they do many jobs which could not be done by women from some other district. Farther north, there are a certain number of women perfectly capable of handling almost any job, particularly if the firm use modern methods of handling and provide the proper lifting tackle.

MR. P. M. HOLMAN : The only essentials in the official minds appear to be aeroplanes or guns. Surely an essential proportion of the tools necessary for other work should receive consideration.

MR. JENKINS : From the Government standpoint every phase of industry is given consideration. The Ministry of Labour decide what particular industry shall be given preference in the allocation of labour, but we don't denude every other section of industry to meet the requirements of those two sections. We must agree to the Government's decision as to what is the essential requirement of the country, but if we take into consideration the aircraft industry, more particularly the air frame section, we are pushing dilution to a much greater extent than in any other section in the engineering industry. When war broke, this industry was about 95% skilled and many of the new factories are working now with only 45% skilled labour and hope to reduce to the region of 30% skilled in the production of air frames.

CHAIRMAN : Dealing with local products, we in the Camborne-Redruth area export a good deal of engineering equipment. What would be the outlook of the Ministry of Labour towards labour so employed in the various works in this district ? Would it be their desire to upset the export trade by weakening the skill required in order to produce the various products for export, or would it be more reasonable to come to an agreed amount of export trade which should be carried out by the labour in the various works in this district ? Mining equipment had high shipping values. We must maintain export trade to retain our Empire and connections. I should like to have a lead from you as to whether export is looked upon as an essential part of our national effort.

MR. JENKINS : This is a question for the Board of Trade in conjunction with the cabinet. The most vital question is the the defence of these islands at the moment. Many firms in the export trade have gone out of business and many firms left are favoured in being able to continue to run their businesses.

MR. ALDER : Regarding the flexibility of young men, if young men are going to be called up, they are the best type to train for the job of setting up machines and to what extent will the calling up of young men affect this flexibility? Another point is, what is going to happen to skilled labour if we are going down as low as 25% skilled? Then, on the question of women working side by side with men, do they get the same payment?

MR. JENKINS : The younger men should be given the opportunity of becoming setters. Where changes are made in the age of reservation, due notice has been given for employers to turn such operators into setters and wherever the age of reservation has been raised, one of the ideas in our mind has been that these people would tend to take existing operators and lift them from one job to another and so avoid the army calling up. This is achieving one of the objects we have aimed at. Whilst we all realise the effects of the loss of the young labour, no one deprecates that more than the engineers. It is the ideal type for the services even from the standpoint of maintenance work. They want young, flexible people who can stand the rigorous conditions. What do you as engineers feel about the calling up of apprentices? I am interested in what engineers feel. You must appreciate that the degree to which one can do without skilled labour is dependent on the volume of the goods made and the amount of money which can be spent on machinery and equipment. No one need worry about what the after affect is going to be. Lots of people suggest that this is going to mean a constant lowering of the degree of skill utilized after this war. Generally speaking, this field has been pretty well explored before the war broke out and from the standpoint of true economics there is a limit to which one can cut down the degree of skilled labour. There is an agreement by which women taking over skilled men's jobs shall be paid the full rate for the job. This is being done at the Vulcan Foundry.

MR. COOMBS : On the question of apprentices, is the Ministry who is taking such an interest in the training of unskilled labour, going to take as much interest in the training of the young men who are to be our future skilled men? We are going to get a repercussion in the future. We are going to find a situation where there are very few skilled men. We must have executives and if we train these unskilled people, where is our field for training executives going to be drawn from in the future? Is the Ministry paying any special attention to the training of apprentices at the present time and seeing that it is not interfered with by the training of unskilled labour?

MR. JENKINS : Ministry training must necessarily be of a very low calibre. It has to be specialised. It would be utterly impossible

for the Ministry in any training centre to give a training which would really make what you or I would term a skilled tradesman. As far as apprentices are concerned and potential executives of the future, you are dependent upon industry itself. Much as I admire what is being done in the Government training centres, I feel that the training received in the factory is always preferable. Under present conditions these training schemes are doing good work in giving training of a very limited character to unskilled people. Regarding the future, unless we can beat this fellow, there there will be no future. We have just got to sink our personal preferences and inclinations in doing all we can to beat the aggressor.

MR. MILLS : It seems that the most important part in this war is production and that the utilization and training of labour is just a means to that end. That being so, are the training establishments which are organised by the Ministry of Labour giving a general training or do they give a short specialised training for some particular job ? Do the Ministry of Labour co-operate with those departments which are responsible for the designs of some of the equipment ? We all feel these can at times be simplified. Furthermore, there is a great hindrance with unnecessary inspection of parts where this is not of consequence to the successful operation of the product. It seems to me if there was keen co-operation between the Labour Ministry and these departments, the main object of us all to increase production would be achieved. The Ministry of Labour should approach firms to encourage their apprentices and to offer them more financial returns, after such a long period of training. There is said to be a dearth of master mechanics. What system of payment does the Ministry of Labour recommend ? Piecework or collective bonus system ? Which pays the best ?

MR. JENKINS : The training schools were originally started as a social measure with the idea of taking people who were unemployable and giving them a certain amount of all-round training which would enable them to at least come into industry with some possibility of developing into tradesmen of one category or another. They do not like specialised training, but what we want in industry are people trained for individual jobs who can help in the productive effort of the country and who can be got out as quickly as possible after the war. We have to achieve : 1. Quick removal of surplus people after the war and regarding this there will be no incentive for them to stop there. With their limited knowledge of engineering, they can never be more than semi-skilled. 2. Employers of labour working in close co-operation with the local office of the Ministry of Labour.

There is now an agreement whereby they can get the labour they require trained and they are entitled to lay down a curriculum

for that particular labour. They can also supply materials and the necessary tooling and have men or women trained on their own lines. As to design, the same lines of demarcation exist in government circles as in industry. Suggestions made by one department to another do not work out too well, but the reaction of the design section to-day to suggested alterations is much different from that of pre-war days, or even 6 months ago. Suggestions for changes in designs are now solicited and it is up to the individual firm to put forward their suggestions to the contracts dept. for whom they are working. The inspector of Munitions Labour Supply is empowered to check your suggestions and is prepared to forward them with his backing. The alterations thus made are not as they previously were, just an agreement between the Ministry and one particular firm, but are definitely embodied changes. As regards inspection, no one attached to the Ministry of Labour would ever attempt to dictate to the design dept., as to the degree of inspection necessary. These are the sort of things you have to settle yourselves, but you will find the design dept., very open minded. With reference to apprentices, I cannot agree with you there. If youngsters will put their back into it, they can get on and it is chiefly up to them, they need not remain mechanics, but can aspire to be master mechanics.

MR. MILLS : My point was that the man who is a good mechanic is likely to remain at the standard journeyman's rate and it is this highly skilled man there is a dearth of. These men do not get paid in proportion to their knowledge, ability and craftsmanship.

MR. JENKINS : I disagree with you. It is very largely up to the man himself to rise to a better job. He may not be capable of an executive position. The worse paid man is the high-grade skilled mechanic, but if he is the right type he has the opportunity of going further.

MR. ALDER : About 12 months ago they asked for a million women in industry and I believe at the present time there are about 600,000 unemployed. Is it not possible to absorb some of the unemployed in this new engineering army before considering the enrolment of women?

MR. JENKINS : I have seen a complete analysis of the people who are actually unemployed and, in general, people who are unemployed are unemployable as far as the present type of labour is concerned, being totally untrainable and unsuitable for employment in the engineering industry and they are called up regularly before panels to be re-examined.

MR. BENNETT : Mr. Jenkins mentioned that production engineers were to blame for the shortage of skilled labour now available. I should like to know what the production engineers should have

done before the war to ensure an adequate supply. You up-grade people and you can up-grade them further until they become skilled for the duration of the war. What does the skilled men have to say about this? Do you think he will be satisfied to work for the same wages? Has the Ministry of Labour time to consider a programme for the down-grading of these men after the war? Will the Ministry of Labour ensure that the same situation does not arise within the next 25 years? As to apprentices, the calling-up age is about 20. In the last war quite a number of apprentices had been in the army for about 4 years before that time. I don't see why they cannot be called up for the army, seeing the high mechanization of the army and air force. In the last war they counted a certain period of time which they hadn't served. If they come back they gave the man an extra year or more at a higher rate of pay than the actual apprentice in his last year, i.e., an improver rate.

MR. JENKINS: We accepted the argument that the day of the skilled man was over and did not realise that we were going through a period of development as regards the entry of specialised machinery which, for the time being, enabled us to get a greater production without a true relative influx of trained labour. Production engineers should study every phase of industry and the continual entry of apprentices into industry should be regarded as part of their job. Apprentices about the age of 20 were more use in industry than the services.

MR. D. OATES: On the training of unskilled men, where a firm undertakes to train men, how will it apply in taking men from the factories? Will they take men the firms have trained and will they then have to draw in another lot?

MR. JENKINS: In very few cases will the Ministry be in the least interested in withdrawing trainee labour. The question is housing the skilled labour in areas away from their homes. We do not want to transfer any labour which can possibly be found within the locality. You can safely say if you train semi-skilled labour you will be allowed to retain that.

MR. MILLS: Does the Ministry of Labour prefer piece-work to a collective bonus system? What have they found give the best results?

MR. JENKINS: The Ministry of Labour is not interested in the system of payment which any particular firm uses. All the Ministry is concerned with is that they supply the labour required. They try to see that wages conditions are right, but it would be entirely wrong for any government dept., to attempt to lay down any rule as to what method of payment would be the best or the right method for different concerns. What we have done is to

suggest to various firms that a given system of payment might achieve certain results but these are only unofficial suggestions. All inspectors are given instructions that rates of pay are not their business. Their job is to deal with conditions of transfer.

MR. HOSKING : On the question of export, seeing that there is a shortage of skilled engineering labour would it not be better to develop other export groups where different labour is used and so release skilled men for munitions ?

MR. JENKINS : The Board of Trade are continually checking to see what can be done, but there is no question of finding new export groups. The difficulty is how far they can allow existing export groups to continue to export. The 750,000 must come from either domestic or export groups. The question is to decide which export group shall lose their business.

MR. HOLMAN : I should like to correct what is perhaps a wrong impression. I was not dealing with export trade at all, as it only affects a very small part. What I dealing with was the tools used in the manufacture of aeroplanes and equipment of the other fighting services, ordnance and so on.

MR. JENKINS : As far as the tool side is concerned, just what the action of the government is likely to be I do not know. Tools and their equipment should be given the highest priority, as they are actually the key to production itself. Under no circumstances will they take men from tool shops unless they feel they can actually supply labour which can carry out those duties efficiently.

MR. CORNISH : There are a lot of women evacuees in this district who cannot get jobs. Is there any scheme on foot that could enable machines and equipment to be supplied for those areas where there are so many evacuees ?

MR. JENKINS : This is not the responsibility of the Ministry of Labour and the change suggested would not be in the best interests of the country. You have not only to provide machinery, equipment and work but also the nucleus of other types of labour necessary.

MR. ASHTON : It seems that the Ministry of Labour are playing with the numbers of men and women engaged in the industry and others whom they propose to introduce into industry like pieces on a chess board. An important factor is to get absolutely the best results by the co-operation of the people in industry and that of the people they propose to bring into industry and I would like to know if the ministry are taking any steps, or propose to, to bring to the notice of the workpeople already engaged, the facts which Mr. Jenkins has mentioned to-night ? I would like the workmen to hear the same facts if an opportunity could be given.

MR. JENKINS: There was announced many months ago an act which gave the Minister of Labour very wide compulsory powers and if there is one thing which has been criticised by the people themselves, it is the fact that the Minister has failed to use those compulsory powers. I can say I have never met a man with a more humane outlook and with a greater realisation of the necessity of getting the good will of the people in this country, than the Minister of Labour, and I feel astonished at the failure of many people to realise the necessity of the country at this time and to pull their weight as they should. I am sure if every man pulled his weight as he should and could, we should not want another man or woman in the industry. It is appalling to see men wasting their time, when they know full that the country is in need of their highest output.

CHAIRMAN: In regard to apprentices, I believe it is our first duty to see the apprentice finishes his trade. I believe to-day the apprentice has a better opportunity to learn a trade than ever before, but I will agree that there is such a thing as human emotion and if an apprentice feels it is his duty to serve on account of having lost someone dear to him, then the point of releasing him for the the services could be stretched. In respect to the employment of semi-skilled labour and trainees, it is not cheap labour at all. Anybody who gets the idea that by employing trainees or semi-skilled men you cheapen the job, is wrong. It costs more in supervision, particularly in the way of charge hands and setters, if wages paid to setters are subdivided and spread over the earnings of the semi-skilled men under the setter. It will be found very necessary to get back to skilled labour as quickly as possible, and I believe that it is the duty of industry after the war to live up to the agreements that have been made in the engineering trade. If we up-grade, we should have full agreement with the trades unions and the employers federation, and it is the clear duty of the employers to see that the employees up-graded go back to their former status. I am positive that a man who has stepped into the trade just to drill holes in a piece of steel, will have no incentive to remain there.

Mr. P. M. Holman moved a vote of thanks to the lecturer, which met with a hearty response.

Discussion

Leicester and District Section

MR. J. RUSSELL GIMSON (Section President, who presided): We have had a very interesting address from Mr. Jenkins, and one which I must confess went a good deal farther than I anticipated it would do. There were many points which will give us plenty to think about, and in this connection we are fortunate in having copies which we can take home and study. I do not propose to say very much at this stage, but there are just one or two points I should like raise. One is, that when Mr. Jenkins mentioned that the Ministry of Labour is prepared to train operatives in the precise way that we, as employers, desire, i.e., that they will work on our own material and give a man the necessary training which will enable him to come along to us in a short time and carry out what we want. Another point which interested me considerably was the suggestion that promotions within the factory are the best way to get good feeling. This is a very important matter. We all know that never has there been a time when the whole country has been so much at one in the desire to get on with a particular job, we know that there are no restrictions in the way of utilising labour to the best possible advantage. It is our business as employers and managers to see that labour is properly employed, each man or woman doing the job for which he or she is most fitted.

MR. SHUSTER: I have listened to Mr. Jenkins with very great interest, more so having been if I may say so on both sides of the fence, and I can assure him that all the points he has brought forward will be studied by this meeting, I am very pleased to note that point which the chairman mentioned, i.e., that the Ministry of Labour will train an operative in any particular line of work. This is a big departure from the ordinary training scheme, which in itself has been greatly appreciated by employers, so I am quite sure that now they will have additional cause for satisfaction. I therefore have very much pleasure in proposing a very hearty vote of thanks to Mr. Jenkins for the talk he has given us to-night.

MR. MARK TAYLOR: Mr. Jenkins has really challenged us this evening and he has described and given us facts which we shall be able to develop in extending the use of unskilled labour in our works. My personal feeling is that the greatest individual difficulty which we have to face has nothing to do with skill, but is a matter of prejudice in the works. Sometimes at the top, and sometimes lower down, there is a firm conviction that what is required cannot

be done and that puts a stop to any enthusiasm lower down the scale. I have had an elementary amount of experience in trying to do what Mr. Jenkins advocates, and it *can* be done, with ease, if one can only enlist the right enthusiasm. I believe that the first and most important thing in interesting unskilled labour is a very careful study of the individual, to ensure that he or she is given the chance of doing the job for which they have a natural aptitude. If one of us to-morrow were asked to earn his living by writing poetry, I am sure we should find it very difficult; and it would be equally difficult for a poet if we were to take him and put him on a grinding machine. Both, of course, would fail. The most important thing is to find out just what the aptitudes of the individual are. I believe that so far as training is concerned, it is no good putting unskilled labour straight on to a machine.

We have found it an advantage to get out instruction sheets, simply worded, with diagrams, describing, for instance, micro-meters, explaining the use of dimensions in drawings, tool grinding and tool setting, or why, if a tool is ground in one way, it works, and if in another way, it doesn't. We find that if we give unskilled labour the opportunity of studying these instructions, they gain confidence instead of getting scared. Their nervousness has gone, which, to my mind, is all important.

To return to the question of prejudice. I believe, that by far the best way of interesting unskilled labour is to get the unskilled labour right out of the existing "shop atmosphere." Set up your machines in a separate shop, get them right away from the skilled people, and you will have overcome a very serious obstacle. We have found girls put on grinding machines, milling machines, lathes, etc., particularly girls from the hosiery trade used to machinery and using their fingers, after three weeks or a month making more bonus than the men. One or two of these have got on so well that they are now in charge of six or seven other girls. This is because there was never any intention to train these girls to operate a lot of handles and levers.

One other point, and that is the importance of giving to those operatives the means of knowing whether or not they have done a good job. It is folly to send a girl's work to the inspection department, only for her to be told that it is no use. You must have better means of rectifying faults, and then you will give them the pride of having done a good job. I am perfectly sure that all that Mr. Jenkins asks for ought to be done, and in a small way I can say from our own experience that I believe it can be done.

I have very great pleasure in seconding the vote of thanks to Mr. Jenkins for his talk this evening.

MR. JENKINS: I should like to amplify some of the points raised

by your chairman and Mr. Mark Taylor before the meeting is thrown open for general discussion. I not only want *employers of labour* to become interested in this question of dilution, training, and the efficient use of skilled labour, but I want *every one engaged in industry* to become interested and to regard this problem as part of his job. It does not matter whether one is employer, factory manager, production engineer, foreman or operator, it is to our individual interest just as much as the national interest to do everything possible to provide the means and tools by which we can smash the enemy.

I want every man in the higher strata of industry to bring home forcibly to the people under his control, particularly the younger people, what it would mean if we were beaten. Give them a clear understanding of what it would mean to the women folk and the children, to their wives, mothers, sisters and sweethearts, a fate possibly worse than death. This may be regarded as somewhat sentimental, but the fate of the women of Poland is a grim reality and anyone who imagines Hitler will be any kinder to the British does not understand the German mentality. I would stress particularly the need for co-operation between labour and management with a view to the avoidance of those small elements of friction which rapidly become major troubles. I have seen by intimate personal contact that the provision of proper working conditions and a realisation of the fact that labour must be paid a fair share of the profits of the industry, in the way of wages and salaries, does produce a spirit of good will and comradeship leading to a collective productive effort which can turn a non-profitable concern into a really prosperous organisation. The study of existing personnel and the institution of a system which gives everyone opportunities for advancement enables the best men to be put into the right positions cannot fail to pay dividends and to help create a spirit of harmony and goodwill. Mr. Mark Taylor mentioned prejudice and whilst I am in general agreement with his remarks, I am more concerned with prejudice of another type, that of failing to agree with or being prejudiced against training, dilution and up-grading. This, to my mind, indicates a failure to understand the problems with which the industry and the country is faced. It is the function of management to drive home to labour the need under present conditions for the introduction of these processes, not for the benefit of any one individual or firm, but in the interest of the nation. Many of the younger generation do not seem to understand the need for this and regard such introductions as being against their best interests, yet, ironically, win or lose, they will be called upon to foot the bill to a much greater extent than the older people.

In the matter of the choice of labour for training, this is another point in which I think industry is remiss. If you will only take the necessary interest and say you are prepared to accept and use trainee labour on condition that you have a voice in the selection of the labour to be trained, I feel certain that the officials of the Ministry of Labour will be only too pleased to play. No one can expect a civil servant to select labour to meet your own individual requirements as efficiently as you can yourselves, but if you show no interest and leave them to do the selection you cannot grumble if the result is unsatisfactory.

If industry got over its existing prejudice to deal with employment exchanges and attempted to "sell" the exchanges on what is required, a spirit of co-operation could be built up not only to meet present conditions but of permanent value to both sides.

I know from past experience that many of their submissions were unsuitable for the jobs available. You asked for a drilling machinist and, if you were lucky, got a good lathe hand.

With regard to training on the shop floor, here I am at issue with Mr. Taylor, as for present day purposes 80% of the people who have to be introduced to the engineering industry are required for some specific task of a fairly low grade. You are not interested in turning them into craftsmen; give them three or four weeks training and they will, from that time onwards make an increasing contribution to your productive effort, and provided you have suitable facilities, it is a waste of time to put them through the full course at a government training centre.

I feel that industry should take a much greater interest in these centres and make greater use of them and am certain that with such assistance the training could be made more objective and more closely allied to individual industrial requirements.

I must admit that I was sceptical as to the possibility of useful training of labour in G.T.C's., but my closer contact of the past few months has convinced me that these centres are capable of doing a very useful job of work, but industry must assist if the maximum benefits are to be obtained from these activities.

One way in which assistance could be given of a most practical nature is by the supply of scrap castings and other materials upon which trainees could operate. You all know how difficult the supply of materials is at present and will agree that it is a sinful waste to use new materials for training purpose whilst scrap is available.

At present a little material has to go a long way in the centres and as a consequence trainees rarely get the opportunity to remove stock using feeds and speeds comparable to those used in an industrial establishment, so that it must be a shock to them to see the difference in stock removal in industry as against that in the training centres.

I would suggest that when trainees first enter the factories, you should appreciate this point and arrange that they be given the opportunity of becoming accustomed to heavy stock removal before being put to work on production operations. Start them on roughing out and take the trouble to explain what feeds, speeds and depth of cut really mean and try to make their work a continuation of the training received.

MR. DENNIS: I am particularly interested in this lecture, and only this week I myself saw an example of operations being spilt up. This particular job was a combination which was reasonably light — a drilling jig. I went to this factory after about six months, and I noticed that same operation, that was done in a box jig, being done by two women. It had been split up into five operations, the two women were doing that, and a man one operation which was obviously too heavy for the women to handle. This seemed to be a very good idea.

I had the pleasure of being shown over one of the training centres and I was really amazed to see the efficient way in which the training was being carried out. *Too* well, I thought, when I saw labour intended to be incorporated in production work being taught the operating of dividing-heads, which of course is a refinement not generally used on production work, as it is an indexing fixture. A firm I know in the north of England has incorporated trainees with very great success, but they are employed in doing the simpler forms of work — things which do not matter.

This paper has been very illuminating in one or two things, particularly regarding the use of old machinery for the roughing operations. This I consider is not used in anything like a sufficiently extensive manner. What I would like to stress is how pleased I am to have listened to this lecture, and I can confirm that I have seen what he has told us being put into operation in various factories.

MR. JENKINS: Mr. Dennis' remark as to the splitting up of operations is interesting as this process is the keystone of operational simplification upon which the successful introduction of green labour depends. I know many people will object that the increased number of times the part has to be handled leads to an increase in the overall production time. It must be admitted that in some cases this is so, but when skilled labour is insufficient to meet requirements and the major requirement is the production of maximum volume such increases in overall time are justifiable if they increase the volume of product obtained.

Under war conditions it is maximum production that is required and, with labour the determining factor, if the introduction of 100% additional labour of the type available will produce 75%

THE UTILISATION AND TRAINING OF LABOUR UNDER WAR CONDITIONS

greater volume, there can be no argument as to whether methods should be introduced by which such labour can be utilised.

But in many cases it will be found that although the work has to be handled two or three times instead of one, the nett result is a saving in both operating and machine time. The smaller number of tools to be picked up and put down in a simple as against a complicated drilling operation, often leads to a more systematic and rhythmic method of working which gives big increases in production. Complicated set-ups on turret lathes or automatics are often good showmanship but inefficient from a production viewpoint, unless the life between grinds of the various tools involved is in good balance.

The removal and regrinding of one tool in the set-up often leads to cycle of stoppages of production due to work varying beyond allowable tolerances. Personally, I have almost invariably found that if one tool has to be reground in the set-up, the most efficient way is to remove and regrind all tools and avoid rejected work or scrap.

The suggestion that the training given in the training centres is of a too comprehensive nature is indicative of the need for co-operation between industry and the training centres, as mentioned in a previous reply. It must be realised that the only original function of the Ministry of Labour training centres was one of social service intended to train men who were out of employment to a stage where they had sufficient training to make them acceptable entrants to a given trade or industry. No knowledge was available as to what particular phase of such trade or industry would be available when the man finished his training and it was necessary to teach him the rudiments of operation covering a fairly wide field of application.

My complaint is that industry still leaves the training centres without any clear idea of the type of training they require for particular vacancies which they have or are likely to have available. How can the people in control of these centres plan to meet requirements unless they are given the necessary information upon which to base such plan? In their endeavour to meet industry, I have seen many cases in which training centres have put men through given courses definitely biased to meet a specific type of job only to find that they have been unable to place them locally.

It is tragic to think that men living in locality "A" have been trained as turners only to find there is no demand for turners, but an urgent one for millers, whilst in locality "B" one hundred miles away they have trained millers, but the requirement is for turners. Admittedly, the two supplies and demands can be met by inter-transfer, but it means that the domestic life of both sets of

men has been upset, lodging accommodation has to be found in both places and allowances paid to both sets of men. It is grossly inefficient and the Ministry gets the blame, but speaking not as an official of the Ministry but as a production engineer, I maintain that the blame is on the shoulders of those people in the industry who fail to make their requirements known to the managers of the training centres, or alternatively, to the local employment exchanges. It is *your* job to determine your future requirements, to pass these on to the official of the Ministry of Labour, and to assist them in their efforts to meet your requirements. The production problem is *your* problem and all that any ministry can do is to give you all the assistance within their power, but this they cannot do unless you supply them with full information.

MR. SHUSTER: Mr. Jenkins mentioned that in each training centre there is a placing officer. Do you not think that a trained engineer should be used as placing officer in these training centres?

MR. JENKINS: I am rather averse to answering questions relating to the organisation of the Ministry and you must realise that any reply I may make is made in my capacity as a member of this Institution. In this instance, I must say that I regard the whole problem of labour supply for engineering under war conditions to be one essentially for engineers, but having said that, I must point out that if we accept this premise we must carry the argument further and say that each phase of industry should be dealt with by a specialist; men with complete knowledge of every phase even of the engineering industry are not available and, even if they were, not one of us would agree with using him for such a purpose.

MR. SHUSTER: I was only referring to the placing officer at the training centre not the labour exchanges.

MR. JENKINS: I still think it would be waste of engineering knowledge and capacity. My point of view is that the question of placing does not arise if industry co-operates in a proper manner. The problem should be one of the training centres training a man for a specific demand for a given type of work in a given factory, the course being agreed between the training centre and the prospective employer.

The employer gets people trained to suit his particular requirements, even using materials supplied by him if he so desires, and the trainee is happy in the knowledge that having completed his training a job waiting for him and that no time will be lost in absorbing him as a productive unit. It avoids the difficulty of having a man pass through various stages of training which, in his ignorance, tend to give him the idea that he is an all-round mechanic. It also prevents a man being trained as a miller, for instance, and then being put to work in the factory as a capstan

operator. Such cases frequently arise, the trainee becomes dissatisfied feels that his training has been wasted and writes a letter of complaint to the Ministry stating that his skill is being misapplied or wasted. I want your assistance in getting people trained in an objective manner for specified jobs and it can and must be done.

MR. AUSTIN : It has been very refreshing to find that whatever else they have not done, the Ministry of Labour have made Mr. Jenkins into a civil servant ! (Laughter). Regarding the speed of operations, one thing has not been mentioned. By virtue of the fact that you make five operations by splitting up a job, you must necessarily have five inspections. Surely this must delay the job ? It is a thing you have got to decide on the job you cannot settle it by sitting in a room.

I would like to have Mr. Jenkins's views regarding the simplification of machine tools. Machine tools have been put into the shadow factories in this country for a specific job, and yet you find expensive machine tools taking a long time to build, holding up engineers who might be on tool production. I have yet to find any lead from the Government on the simplification of machine tools, and I think this is very important. Mr. Jenkins gave us some very impressive figures regarding female labour in the aircraft factories. They are impressive—just so far. What would impress me more is to know whether production has gone up somewhere in proportion with the increase of personnel. I know of one case where a firm pride themselves on dilution, and they were unfortunate enough to have midnight visitors, and had to bring the night shift on the days. Even though the machines were working half-time, their production went down five per cent. Frankly, I am very much of a sceptic with regard to women labour, in our own particular place, and I have seen any amount of "window-dressing", and "window-dressing" in firms who have not got to consider production times or the cost of the article produced. If you are getting 10 or 15 per cent, all is good. You can have the trainees standing round watching the other men work. But in self-preservation, we must consider the efficiency of our shops.

MR. JENKINS : First of all I can assure Mr. Austin that no one will ever turn me into a civil servant. As regards inspection after splittings of operations, can Mr. Austin tell me why he feels it necessary to have five stages of inspection when the work carried out on the piece is precisely the same in character and degree as would have been done in one operation and with one inspection ?

As Mr. Austin knows we used green labour to a very large extent in the company with whom I was employed before the war. To do this successfully, we carried out task simplification to the nth degree, realising that so far as possible jigs, etc., must be fool proof, and they were in many cases so designed as to check automa-

tically the accuracy of the previous operation or operations. Sound commonsense methods and a little ingenuity in design will enable any manufacturer to use such methods of simplification without an additional inspection costs and possibly with a lower scrap or rejection percentage.

The question of machine simplification and the elimination of those features not required for our normal products is one that has worried me not only since the outbreak of war but for a long time before and is, I think, of interest to all production engineers.

I cannot, however, agree that this is a matter primarily for any Government department, but is one for the machine tool manufacturer and his customer to deal with. It is one which should be tackled under peace-time conditions as the demand is too insistent and delivery requirements too urgent to attempt to go through a period of re-design under war conditions. What can and should be done where possible, is to order standard machines, less those features not required, but with the machine carried to a stage where the parts could be fitted at a later stage if required. I have carried out that procedure quite extensively during my peacetime activities. I imagine many purchasers of machine tools are being biased by their after war requirements rather than the war production in determining the nature of their purchases.

With regard to the output of female labour as against male labour, I can assure Mr. Austin that in general the output of the women is equivalent to that of men, whilst in many cases, it far exceeds it. This applies particularly to those jobs of a monotonous nature of which men get quickly tired, women seem naturally adapted to carrying out such tasks and shew a tendency to become faster as time goes on, particularly if they are working on a straight piecework basis. It is really amazing what a change comes over women when they have an opportunity to earn a little more money, and as an illustration I will quote an experience of my own during the last war. We had women on fuse work operating on a day work basis and producing a given part at the rate of 250 per day. My own experience of production of the same parts lead me to believe that 750 pieces per day could be produced. Piecework prices were fixed on the basis of this knowledge and, to cut a long story short, I was amazed to find these women produced up to 2,500 pieces per day.

There is one big difference in the outlook of men and women on this question of maximum production. The average man decides what he thinks the management will allow him to earn before prices are cut and produces accordingly. This outlook one must agree is in many cases the result of bitter past experience. On the other hand women go all out to get as much as can possibly be

got out of the job and leave tomorrow to look after itself, whilst in many instances their outlook is of a higher order of patriotism than is shewn by many men, possibly because they have sweet-hearts, brothers or sons in the fighting forces for whom for they must do their utmost.

Your remarks on the introduction of women for the purpose of "window dressing" may possibly be based on a sub-stratum of truth in some instances, but in general they have been found to be a sound and economic production factor. My personal reaction towards those who carry out window dressing of the type you suggest is put them against a wall and shoot them for treason.

MR. WEEKES (Chief Inspector, N. Midlands Labour Supply): In this division we have one centre in the town and and if we can train all the labour required by this town, would have to work 40 shifts. It can only train a very small proportion of the total labour required, and while I endorse Mr. Jenkins's remarks, I do not want to see a queue outside the labour exchange to-morrow with requests for a particular type of man in three months time. Mr. Jenkins mentioned Rolls-Royce. It is interesting to note that they have other works where there is an even higher percentage of females than at Derby. The bonus runs even higher than at Derby. Man for man and woman for woman, they are turning out more engines than Derby.

Mr. Jenkins has stressed the need for putting women into industry. In the early days of the war male labour was easy to obtain; now it is very different. The engineering industry has had to absorb many males, in certain areas particularly—people who should never have been in engineering. Now they are taking on women, and say: "We would like to sack these people; the women are doing better work, and we are having to place those males." I would like to say that if you are expanding, there are jobs that only males can do. You will also have to find unskilled male labour because it is very doubtful if there will be very much male labour available for placing.

MR. JENKINS: I appreciate the limitations of any given training centre, but would point out that these centres are not yet being used to their full capacity and I shall not feel happy until they are. I feel that the method I have outlined will produce a larger number of trainees in a given time and of a type to suit industrial requirements than can be produced by any other method. As regards the figures I have mentioned, I have endeavoured to be conservative, as I know how fond engineers are of challenging figures and if one is once proved incorrect the lot become suspect.

I feel it unnecessary to stress the scarcity of male labour or the fact that the demands of the various services are forever making it

scarcer still. I must warn you all that we must and shall take skilled labour from existing organisations to provide the nucleus of labour for the new factories which are being rapidly completed and tooled up for production. If you had seen, as I have in the past few weeks, plant, machinery, tools, equipment and material waiting for this skilled labour to commence production of highly important munitions you would regard it as a crime not to do everything possible to release suitable labour by the introduction of dilution wherever possible in existing factories.

If I had the power to do so, I would say to my inspectors, "Go out and pull them out ruthlessly and leave those people who have neglected to train substitute labour to get over their difficulties." It ought to be done and sooner or later it will have to be done. Much as the Minister dislikes compulsion and rubbing people the wrong way, I feel that he has got to use ruthlessly the powers bestowed upon him by Parliament.

MR. ADCOCK : May I relate a little experience of my own ? Some two months ago we had a meeting, and Mr. Shuster stressed the point about female labour. Now we have got fifty and we are very happy with those fifty. We have only had three who have had to be cleared out. We have getting better production, no troubles. We had got troubles with the men ; only to-night my son said, "There are two men who are not pulling their weight." I said "Let me look into this ; no doubt there are two women who can take their places." We are very happy about it ; it is the first time that the turning department are on top of the job. The women are doing turning, milling, grinding. There are a few on fitting, though I am afraid we cannot do much in this direction—but the machine hands are good.

MR. JENKINS : I am pleased to hear Mr. Adcock's remarks, which only confirm what many hundreds of employers have stated to me in the last few months. I may say that during the last war I organised, or rather re-organised, a fuse factory and trained women as toolsetters, but with this proviso that they were toolsetters only and that all tool grinding was to be carried out in the tool room. I put one male chargehand setter to look after six of the female setters and to assist them when they found difficulty.

One mistake I did not make ; I did not expect them to work for 50/- per week but paid the standard rate for setters and right well they earned it. Women can be used as toolsetters on routine jobs under proper supervision, but not on the more intricate work. This does not change my viewpoint that toolsetting is an art and that real toolsetting involves the location and cure of troubles and inaccuracies quickly and the production of a consistently accurate product.

CHAIRMAN : It has been a very great pleasure to have a meeting at which there has really been time to deal with something, and I think it is obvious that members have appreciated the opportunity. The questions and Mr. Jenkins's remarks appertaining to them have added very materially to the interest of the lecture. Once more I pass on the thanks of our members to Mr. Jenkins for coming here to-night to address us.

MR. JENKINS : I appreciate the opportunity given me to come here to-night and to amplify what I have said in my paper. You may feel that some of my replies have been made in an emphatic and possibly somewhat rude manner but please do not take it is meant that way. I am interested in one thing and one thing only, that is winning this war, and any statement I may have made is for the purpose of stimulating activities to that end.

I ask you not to give way to personal prejudice against dilution or the introduction of female labour and, if in the early stages you find a slight increase in costs or a drop in output from a given amount of plant, keep pegging away until you have regained or even improved your previous efficiency. The main factor you must take into consideration is that it is the gross national output that counts in the final analysis and the men you have released for other activities have enabled a further influx of green labour to be utilised to that end.

Discussion

North Eastern Section

MR. W. A. HARRIMAN, M.B.E. (Section President) who presided : As one of those who has had to face the problems enumerated by Mr. Jenkins and is associated with a concern which in a small way is trying to carry out some of the points outlined in his paper, I feel we are confronted with problems which unfortunately in the first case have been treated, with all due respect to the civil representatives of the Government present, by people who have not been associated intimately with the industry. I believe this is partly due to our trades unions—I am not going to blame them altogether—and partly to ourselves, the executives of the production side who have not, in my opinion, in the past had their light shining brightly enough. We have got a handicap to start with in dilution. Perhaps this is quite out of order and that I, as Chairman, should not raise any political or controversial question, but I think we have the position of a handicap of the skilled man, in any operator being paid the same rate as the skilled operator. I have always felt we would have advanced much quicker with dilution if we could have had some system which was based on the principle—and don't think I want employers to get anything out of it—of skilled workmen having a bonus on every one of these dilutees in the same way as civic authorities compensate a town clerk when they bring in other town clerks to help with certain work. I feel we should give a bonus to our skilled workmen for accepting dilutees into the works. If we had done that it would have been accepted more openly. That is one of our troubles, but we have gone too far now to find any solution at the moment. I have listened to Mr. Jenkin's paper with extreme interest. He might have been reading my mind in some of his remarks, for I have had some of his points in mind and have tried to accomplish his aims. For instance, in our tool room we have sub-divided tool making to a great extent. We have been able with the aid of very good skilled tool makers to produce the most efficient and accurate tools by semi-skilled and unskilled labour. Jig boring machines have always been operated by semi-skilled labour, but at the present moment we are going to start a serious experiment and utilise women labour or try to train women labour on these machines. If we happen to do that I think we shall have got down to your ultimate efficiency in the dilution of labour. I do not know whether you will give us full marks for that or whether you will want something further but I must say the skilled labour in the works, when a matter is put to them in the right way, are

most eager to help. But one has to realise they are human the same as ourselves and they want treating on those lines. They want proper precautions taken to see to it that these dilutees will go out of the factory after the emergency is over.

MR. JENKINS : I may say I do not regard myself as a civil servant.

MR. HARRIMAN : Pardon me, I was not referring to you. You came here as a member of the production engineers and therefore I must apologise if I was misunderstood. I realise that, as a member of the production engineers, you are one of "the lads."

MR. JENKINS : I made that remark specifically because I propose to defend to some extent the civil servant. I perhaps have as many quarrels with civil servants as any of you, but I do appreciate that civil servants are trying to do a difficult job. They have been called on to assist industry. The task is not their choice but they are doing their "darndest" and if industry had taken a keen interest from the start and attempted to be co-operative they would probably have received much greater assistance than they have now got. I myself used to resent to some extent Government control and felt I could do much better for myself than the civil servants could do. It is only after a time that you appreciate the need and wisdom of the Ministry of Labour stepping in and preventing insane competition for skilled labour which would not have assisted industry and would have started a system of indiscriminate wage increases, and would not have helped us at all in our object of utilising the skilled labour available and making the best use of it in our particular phase of industry. On the question of rates of pay for dilutees I believe the matter was agreed between the Trades Unions and the Employers' Federation. If so, don't blame either the civil servants or the politicians. If your representatives make an agreement with a trade union with which you afterwards disagree you must not blame the civil servants for that. The Chairman has put forward a suggestion regarding the payment of allowances based on the proportion of dilutees accepted. But you could quickly run into a stumbling block. I am going to ask the Chairman a question now. How would he propose to end that sort of thing when this war is over? You introduce into industry all sorts and types of men and boys in normal times and your skilled rating has to train them. Ninety per cent. of the men coming into industry are trained by the men on the bench or the machine, and if you introduce a system of this nature they would very soon be saying that what was good for war time was good for peace time. Apart from that, however, the plan is ruled out by the utter impossibility of deciding just where dilution commences and finishes, and settling any fixed proportion of dilutees to skilled men in any particular industry. We know full well that if you take two firms who are engaged on precisely the same product and check up on what they are prepared to agree

to as the proportion of skilled labour, unskilled and semi-skilled, it will vary widely according to the policy or character of the concern. The adoption of the Chairman's suggestion is one that would have given him many more headaches than he at present suffers. If there is one thing the country has got to be thankful for it is the excellent and generous way the trades unions have agreed to accept dilution. I sincerely hope the employers will realise this and will do their best to return to the *status quo* as it existed in pre-war days. It is up to everyone to see to it that we play the game straight by the people who work for us, whether they are unionists or non-unionists. As regards your Chairman's line of thought being similar to my own expressed in this paper, I think this is a good indication that I am thinking on the right lines. Incidentally, I happen to have been trained in an industry, which, although of a different type to that of your Chairman, is one that lends itself to organisation of a broader character than the main industries of Tyneside. Therefore if we analyse a problem we are bound to think on parallel lines. Regarding the utilisation of female labour on jig boring machines I think it could easily be done, provided they received sufficient mathematical training and worked under adequate supervision.

I have always regarded the jig boring machine as one eminently suitable for operation by a tool room trained ex-apprentice. It is a comparatively simple machine to operate and when used on jig boring operations it gives the operator a good opportunity to get a good basic knowledge of jig design. If he is of an enquiring frame of mind he will often gain experience of a valuable character as he cannot fail to see the mistakes of the manufacturing type made by the designer. Detection of errors is good schooling and a youth who has had experience of this type is far less prone to make similar mistakes should he gravitate to the jig and tool design department.

In the firm with which I was connected many of our apprentices finish up in the planning and tool division and, we felt that the operation of the jig boring machine was good and useful training for such youths.

THE CHAIRMAN: I want to be quite fair with Mr. Jenkins. I mentioned trades unions, but the whole three were in the thing—the employers, trade unions, and civil service—and we made a rod for our own backs. Mr. Jenkins will admit that the skilled engineer from 1920 to 1937 was more or less on the dole, or in and out of the factory due to shortage of work, or had perhaps to leave his own district. He has not had any corresponding compensation for dilutees being brought into the shop. There is one passage in Mr. Jenkins' paper which confirms the point. He stresses that a man is given a lower standard of living although a skilled workman and doing a skilled operation. I feel that is really a slur on our industry. The highly skilled work should always, in my opinion, receive the

highest pay. I don't want to say anything about the headaches he threatens me with if I could get out of the rut by paying these highly skilled people a higher rate of pay, but I think they should have it whether it is war or peace. At our opening meeting I said that I felt the great depression was because of our conservatism and not producing efficiently. It is necessary to produce efficiently for war purposes—it is to preserve our own lives—but in peace time also we have to produce efficiently because we must compete to live, and we must have our country back in the front rank in competition for the world's trade. Therefore, if we try for a time to make our industry such that the high-skilled jobs are paid at good rates against semi-skilled jobs I think we shall have accomplished something all along the line. I believe Mr. Jenkins will accept that as an explanation. I want to see the practical side of industry getting compensated in the same way as the theoretical side. I don't know whether you see my point, Mr. Jenkins, but I think it could be done by the grading of jobs as outlined in your paper.

MR. JENKINS: Thank goodness my method of attack has brought your Chairman to his feet to say exactly what he meant. Skilled men are badly paid, I agree. The firm I was connected with considered this matter and we had a general manager who was of the same opinion as your Chairman. He saw this thing was entirely wrong. We already had differentiation of the basic rates for skilled and unskilled men and we decided to take at that time the average bonus earnings of the factory and consolidate that as bonus for our skilled men. I feel this has nothing to do with the introduction of dilution. It doesn't matter to me whether you have 5, 10, or 50% dilution. The fact remains that you should still pay skilled men the differentiation in rate to which they are entitled owing to their greater skill. This expression of opinion, I should say, is entirely personal and has nothing to do with the Ministry of Labour. Any expression of opinion I give is just as a member of the Institution of Production Engineers and does not bear any political significance whatever and does not commit the Ministry of Labour in any way. I am pleased I have met someone like your Chairman who has this point of view. Most of us realise—masters and men alike—that you never get more than you pay for. The best labour, which is usually the best paid labour, is the cheapest in the long run.

MR. HARRIMAN: Mr. Jenkins talks about training apprentices on jig boring machines. Now I consider that we train our apprentices perhaps in a good way by not putting them on jig borers. We have one or two apprentices I see here who were on jig borers during the time they were in the works. But Mr. Jenkins' company being a motor car company would have any amount of money, and therefore could have surplus machines, but we have always been in the unfortunate position of not having sufficient machines to get the jobs

through, even working twenty-four hours a day, and we find that having apprentices on machines does not give the desired production. We had not gone so far as to think the jig boring machine was a machine of the character which even required skilled labour on it. Therefore, we have always manned it with semi-skilled labour but we are, due to people being patriotic and joining the forces (I wish they could have read the last few paragraphs in your paper and not joined the forces) now attempting to utilise female labour on these machines. I think you will accept my explanation.

MR. JENKINS: I could accept the challenge and give you an answer, but as it is not exactly relevant to the paper I will refrain. When anyone writes a paper of this kind he must be prepared to be shot at.

MR. C. R. PERKS: I should like to have your opinion on this problem. A very efficient member of the Ministry of Labour called at a factory with the idea of suggesting the introduction of diluted labour. He went to the capstan section and found the section was manned largely by semi-skilled men and he investigated the machine and found the quantities and accuracy such that female labour could have been introduced on the machine but the machines supplied by the Ministry of Supply precluded the introduction of female labour on them. A fairly heavy pressure was required on the collets and the bar closing mechanism was operated by a hand lever. The force required was too much for females. Is there any co-operation between the Ministry of Labour and Ministry of Supply in regard to such machinery before it is despatched to this country?

MR. JENKINS: The type of machinery purchased is in no way the responsibility of the Ministry of Labour, therefore the supply departments would not enter into any discussion with that Ministry on the matter. It must be appreciated that the Ministry of Supply have been only too glad to get machines of any type, it has been a case of taking whatever was available. At the time of purchase they would not know whether machines were to be handled by male or female labour. It would not matter whether the machines were of British or American manufacture, the same difficulty would possibly be encountered of the collet closing mechanism being too heavy for operation by female labour.

If an inspector of the Ministry of Labour accepted the difficulty as being a valid reason for non-employment of female labour, he was a "weak sister." He should have asked that the machines be altered to increase the efficiency of the leverage so that female operators could be used. A quarter of a century ago I had a similar experience with a $3\frac{1}{2}$ in. bar machine but found no difficulty in redesigning the collet closing mechanism to suit female labour.

MR. HOLMES: I met a similar case where female labour could not be used on a machine, and the management of that particular

firm were insistent that female labour should be employed. They definitely made these girls work these machines. They put a few men in the vicinity of the girls to observe them, and these men came to the conclusion that the girls were using the sky as leverage instead of using the floor, and by the simple process of showing the girls which end of the wrench they had to get hold of all the troubles were got over, and these machines were successfully worked by female labour. I think in a lot of cases where objections are brought forward against the use of machines by female labour a similar process could be applied, and it would be found definitely that they could be.

MR. JENKINS: You are going on to another point perhaps unintentionally. One of the frequent weaknesses one finds in the training of labour, particularly of the green type, is that no one takes a real interest in teaching operators even the minor fundamentals of the machine operation. It should not have been necessary to have men watching the operators, their job should have been to instruct the women. There is only one position in which operators can best utilise the leverage provided, and a few minutes would have sufficed to teach it.

It is necessary—and everyone should recognise the necessity—to take a little more interest in female labour when they commence a new job of work, particularly if it be on the heavy side.

The effect of strain is much more severe and likely to lead to greater complications than in the case of a man or a boy. Take the case of weight, for instance. I have seen women working to the limit in this respect and feel that it is damnable that women should be allowed to operate under such conditions. Proper lifting tackle of the snatch block type plus machine loading cradles would make the task simple, would be quicker, and would lead to higher output owing to a lowering of the fatigue factor.

These little things mean everything to production, and the firm which objects to spending a few pounds on equipment of this nature needs a course in business economics. The result of such neglect is lost output as no operator, male or female, who is over fatigued ever produces to the maximum, whilst the accident rate always rises.

According to a remark made by your Chairman, motor car firms have lots of money to spend on plant and equipment. That may or may not be true, but I can assure him from personal experience that the leaders in that business are the hardest headed business men in this world. They expect that money spent will save money and make money; in other words, it must be profitably invested, but I have never known a case where such firms burked at providing proper handling and lifting tackle.

MR. J. D. SCAIFE : The discussion is tending to become rather academic. I have been brought up on mass production, and my experience has been that the less skilled labour there was in proportion to the total labour, the better the job. There is not the same amount of skill in the works at the present time as there used to be. Most of the skill has been taken away from the job even from the point of view of those people whom we term highly skilled men. There are a certain number of skilled men, but they are very largely working in tool rooms and maintenance departments as mechanics. I have had the opportunity of observing in Russia, where there is a very great shortage of skilled labour, and I saw there in engineering machine tool shops female labour among the men, and I was assured by the managers there is very little difference between the men and girls in doing the job. It may be you think that doesn't mean much, but I had an opportunity of observing these women at work and they seemed to me to be doing a very good job. I don't see that there should be any difficulty in using both female labour and unskilled labour with organisation and assistance from the managements. The only thing I can see against it is the inexperience of the managers. We have had so much up-grading of managers and many of them have not had the experience in dealing with unskilled labour and female labour, I think if there is a difficulty it lies there. But with modern machinery there should be no difficulty in utilising the labour available even for the best machinery. We not do experience it in making machine tools. We can utilise semi-skilled and unskilled labour and in the near future we shall utilise female labour as well. I don't say the same efficiency is there, but some efficiency has to go by the board in these times. It is just a question of getting output with machinery we have and getting over difficulties like those Mr. Perks mentioned, and assisting women to get over certain degrees of hard labour, where it is too hard for them. I don't think there should be any difficulty. We ought to keep our minds on the main spot, which is that at present we have to utilise the labour that is available. The main thing is to get output and to tackle the job willingly and with determination. I have had forty years of utilising unskilled labour and I don't see where the difficulty lies at the present time.

MR. JENKINS : I don't propose to reply extensively to Mr. Scaife. I thought he was going to stress the question of efficiency. What we have to aim at as a nation to-day is not necessarily the efficiency of the individual or efficiency from private profit motives. We are interested in efficiency from the output standpoint of the whole of the plant we have got in the country, and if by the introduction of semi-skilled or unskilled labour we can produce from a plant more pieces, although the overall cost is raised, that is what we have

to drive at. The national interest is the interest of all of us and if it is necessary to some extent to sacrifice profits to get a greater overall output in the final analysis we shall all be better off. Looked at from a national standpoint, if by the introduction of additional available labour, which means unskilled or trainee labour, we can increase the overall output from the factories, then it *must* be done. I think that is the point which Mr. Scaife wishes to stress.

It is perhaps as well to make one observation on Mr. Scaife's statement that we are eliminating skill from the factory. My contention is that by all the means in our power we are eliminating skill from the laborious side of industry and transferring it to a more congenial atmosphere. We now want skilled men to operate as planning engineers, jig and tool designers, and toolmakers. We want the skilled man to aid in devising ways and means of making production easier, less laborious, and cheaper, with the ultimate aim of achieving a wider market and at the same time giving well paid employment to those members of the human family incapable of carrying out the higher grade tasks.

That is the aim of production engineers, and if any of my audience will take the trouble to investigate those firms which are most highly organised for the elimination of the skilled man from the workshops they will find that these firms are paying the overall highest rates of pay to their workpeople and are at the same time among the most successful firms from the point of view of return on capital investment. I am sure you will all agree that we are working along the right lines in widening the field of application for the skilled man. At the same time we are employing a lower grade of men on producing better grade work and they are receiving higher pay packets. I do not think there is anything for production engineers to be ashamed of if this is what they aim at. If I felt that my work was tending to lower the standard of living of the workers of this country I would retire and make a hole in the water.

MR. BOWEN : Is it not a fact that women in factories in certain parts of the country are turning out more and better work than the men working alongside them? This question of the dilution of labour should present no difficulty if they use women in industry or munition factories. Take the factories in Birmingham, where I know several. I have seen women turning out better work than the men on similar work. Psychologists tell us that women of twenty or twenty-one at present are more intelligent than men of twenty-one. Why should there be any difficulty in labour problems when there are so many women to call on?

MR. JENKINS : In certain operations women are obviously more suitable and I think in many cases it is because they are less intelligent. I know Birmingham very well and it is probably the cradle

of women in the engineering industry and generally the women employed in it are of a fairly moderate degree of intelligence. There are some firms who have got a fairly good strata of all classes but generally speaking women who in the normal way operate machines and do assembly work and so on are women who frankly are in the engineering industry from the standpoint of what they can earn from it. However uninteresting the work may be and however monotonous, the urge to get every penny from it is the main urge with them. It is not a question of intelligence, but there is something in the make-up of women which enables them to do the monotonous tasks much better than a man can. If that shows a higher intelligence I will accept it, but frankly I don't think it does. I am not suggesting that women of higher intelligence would not operate these machines better than a man, but I am going to amplify your first statement and say there are many cases not only of women but of men introduced under the dilution scheme who are producing work of a standard equal to that produced by what I regard as the skilled operator and in greater volume. That again, I think, is explained by two things, one the earning motive and the other the fact that these people realise they are not likely to be required in industry after the war and are not concerned with what is likely to happen afterwards to piece prices. Others, despite agreements on the part of managements that prices shall not be cut, cannot get away from the fear that such agreements will be broken. They have probably had bitter experience of firms in which promises, like pie crusts, are only made to be broken. I think most live managements are agreed that having set a price which is economic they are not concerned with the increased earnings of the operator. What they want is the maximum possible output from each piece of plant.

Analysis has shown that in many places dilutee labour is producing a higher rate of output than the normal operative staff and the regular operatives, although willing, appear to be incapable of producing at the same rate. One can only conclude that these people have got into a given swing and cannot change its tempo. They have got so used to working in a given way that their actions appear to be more or less automatic.

I want to sound a note of warning, as whatever one may think, and however important the output of the factories in the Tyneside area may be, you are going to be faced in the near future with the dearth of male labour of any type. Despite the fact that you have abandoned to some extent your apprentices schemes, you do produce in this area a type of labour which is not prevalent in many other areas in the country. In other words you produce the old-type engineer and they are badly wanted in other parts of the country to assist to balance up either people of a specialist character or people of the semi-skilled type. As Mr. Gunn knows, I have asked

for assistance in getting male machine operatives who understand certain work. It is difficult in the south of England to find any man who has the technique required. Now is the time to face up to it and see what you can do about it. Mr. Gunn challenged me to talk to his inspectors and referred to me as an expert. I never regard myself as an expert—the older I get the more I realise how little I know. For instance, I know very little about marine engineering, and it would be presumptive on my part to come to Tyneside and attempt to tell you how to put your house in order. All we can do is to suggest to you certain things to be done, realising you are the people who can tell us how it can be done. That is the spirit I want to see among the executives concerned with production on Tyneside. You have a terrific problem and it does entail you absorbing additional male and female labour and getting additional output by so doing.

MR. LUNT: An important thing in training labour under war conditions, which seems to be given very little thought by most executives, and that is not so much in the training of employees but in their selection. We have heard a lot of useful talk and information about efficiency improving where female labour is better than male. The last speaker mentioned certain ages. Can Mr. Jenkins tell me if the question of the selection of employees has been studied to any extent? Has the industrial psychologist been used in the selection and training of employees for war production? It seems to me this is something which is vital now and equally important after the war. As a member of the motor car industry you will be familiar with selection methods of that type. Can that be used to any great extent in these times?

MR. JENKINS: If you are talking about industrial psychology, very few firms in this country have attempted to use the services of the Institute or the methods outlined by them. But if you analyse what is meant by industrial psychology, I think you will agree that it really means the use of plain common sense and analysis of given factors along common sense lines.

Most live firms realise the value of a personnel manager having a wide experience of human nature who is able to select men and women of the right type for the tasks to be performed—one who is prepared to judge people not necessarily by their industrial background, but by analysis of certain characteristics and reactions. Where you find a personnel manager of that type, you usually find he achieves results. I may say that the Ministry of Labour has in the past few weeks discussed this question of the use of psychology in the selection of workpeople with the representatives of Messrs. Rowntree, but with what result I am not in a position to state. Personally, I think this is a question for industry itself to investigate but do not consider war time an ideal period in which to try it out.

MR. BOWEN : General Motors has been built up on psychology, particularly sales psychology as practised in America. I believe they employ a professor of the art.

MR. JENKINS : I don't wish to enter into a discussion of the merits and demerits of American systems as against those of the British. I have great admiration for many things which are carried out in America, but at the same time detest other of their practices.

I know a little of the organisation mentioned by Mr. Bowen and can say from experience that in many respects it is one of the most humane firms in regard to its treatment of its employees. At the same time it is ruthless in its determination to get and maintain efficiency. The Corporation has realised that labour must be given a square deal and be paid an adequate share of the profits of its product if production is to be kept on the highly efficient plane they demand. The fact that from a small beginning not very many years ago, it is to-day one of the wealthiest organisations in the world, indicates that the common sense policy they adopted has paid a good dividend, as it was expected to do.

The policy of high wages backed by an efficient welfare organisation operating on a broad basis for the benefit of its employees may be regarded, by people who do not believe in such things, as pandering to the workpeople, but the returns prove the policy to be right. This method of treatment may be regarded as industrial psychology. Again, I prefer to call it sound business common sense.

As regards sales psychology, I would point out that application of the same psychology as used in the States cost the Corporation quite a lot of money in this country. Having realised that they had got to change their ideas regarding the buying philosophy of the British nation, they have since turned that loss into quite a handsome profit. This indicates to my mind that you cannot take any standardised method of approach even to problems of like nature. It boils down to common sense analysis of the particular problems in a given field of application.

MR. HARRIMAN : I would like to quote a practical case of dilution from my own works. I had occasion to give a job to one of my foremen who stated that he had not got sufficient skilled men to handle the work. I suggested it could be handled by female labour, his reply being that it could not be handled by such labour. When I explained to the pattern maker what I wanted done he said that it could not be made in the manner suggested and he was extremely upset as the method was unorthodox, but I insisted upon the job being handled in my way. The work was satisfactorily completed by labour with less than three months experience, and we now have a repeat order from the same firm.

It is my confirmed opinion that to achieve dilution satisfactorily you must have planned action, possibly along unorthodox lines, aimed at breaking down and simplifying operations to suit the labour available. I agree that firms engaged upon the smaller and repetitive types of work have an advantage over those manufacturing larger units, but I believe that the same general principles can be adopted with advantage whatever the type of work may be.

If the available skilled men are properly instructed and used to overlook and assist dilutees and work is well planned and tooled, it is possible to increase output greatly, of high standards of accuracy, in a comparatively short time without the addition of further skilled men.

MR. SCOTT: I should like to thank the Institution for inviting me here to-day and I congratulate you on your meeting. That you should have such a good meeting on a lovely Saturday afternoon is remarkable and augurs well for the branch here. If there is one criticism I would offer it is the tendency to concentrate too much on machine tool work. That is a small percentage of engineering and I would commend you to the idea of getting speakers on other sides of engineering. The adoption of female labour is fairly easy. We have had experience of it in all branches and we are now considering putting them on to heavy presses. We have men who have not seen an engineering shop before working 1,500 ton presses, and if we haven't enough to double-up we are going to have women. We have had a lot of success both in regard to women and efficiency. We have a girl who has worked for nine weeks on an automatic lathe and hasn't had a rejection yet. I would like to offer our best thanks to Mr. Jenkins.

MR. GUNN: I came to Newcastle about a year ago and with a small amount of common sense, even for a civil servant. I realised that a little knowledge of engineering was a very dangerous thing. So I consistently refused to accept Mr. Harriman's invitation to go over the works of which he is so worthily proud. I could not refuse to accept his invitation to the excellent lunch his firm is known to provide. On that occasion he insisted that I should go over the works. I believe I am the last civil servant who will be given such an invitation, because having asked to see some gauges and jigs, I completely disorganised the firm's work for the rest of the afternoon by saying, "Why is a jig called a jig?" I believe all the foremen went about the works asking the question. Our engineering experts have assured us in the last nine months that the use of trainee labour and semi-skilled and unskilled labour was nearly impossible on account of the work done on Tyneside. I shall now be able to say to all my experts in consequence of this meeting that there are no difficulties in employing unskilled and semi-skilled labour in heavy engineering. In thanking Mr. Jenkins, I hope his

opportunity of realising the weaknesses of the civil service will, when this dreadful war is over, add to his proficiency as a business man and engineer. We have all enjoyed his lecture.

MR. JENKINS: The main recompense you can give me for the time spent here, which has been a pleasure, is for you to do your damndest to carry out what I have suggested, as a means of meeting your difficulties. I find difficulties in life most interesting. Nothing is more interesting than tackling something which appears to be impossible. When you think of what our Air Force did last year it is a slur on us if we are going to lie down and say we cannot overcome our difficulties of getting increased output when all there is available is unskilled labour. If you can do that, you have made one of the most valuable contributions to anything in this country.

Discussion at other Sections

Discussions on Mr. Jenkin's paper took place also at the Yorkshire, Western, Birmingham, and Coventry Sections of the Institution, but these are not being published separately as most of the points raised have been covered in the reports presented above.

